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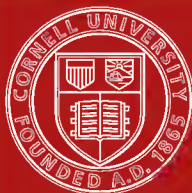
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LOVE'S MEINIE.

LECTURES

ON

GREEK AND ENGLISH BIRDS.

GIVEN BEFORE THE UNIVERSITY OF OXFORD.

BY

JOHN RUSKIN, LL.D.,

HONORARY STUDENT OF CHRISTCHURCH, AND SLADE PROFESSOR OF FINE ART.

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ADVICE.

I PUBLISH these lectures at present roughly, in the form in which they were delivered,—(necessarily more brief and broken than that which may be permitted when time is not limited,)—because I know that some of their hearers wished to obtain them for immediate reference. Ultimately, I hope, they will be completed in an illustrated volume, containing at least six lectures, on the Robin, the Swallow, the Chough, the Lark, the Swan, and the Sea-gull. But months pass by me now, like days; and my work remains only in design. I think it better, therefore, to let the lectures appear separately, with provisional wood-cuts, afterwards to be bettered, or replaced by more finished engravings. The illustrated volume, if ever finished, will cost a guinea; but these separate lectures a shilling, or, if long, one shilling and sixpence each. The guinea's worth will, perhaps, be the cheaper book in the end; but I shall be glad if some of my hearers felt interest enough in the subject to prevent their waiting for it.

The modern vulgarization of the word “advertisement” renders, I think, the use of ‘advice’ as above, in the sense of the French ‘avis’ (passing into our old English verb ‘avise’) on the whole, preferable.

BRANTWOOD,

June, 1873.

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LOVE'S MEINIE.

“Il étoit tout couvert d’oisiaux.”

ROMANCE OF THE ROSE.

LECTURE I.

THE ROBIN.

1. AMONG the more splendid pictures in the Exhibition of the Old Masters, this year, you cannot but remember the Vandyke portraits of the two sons of the Duke of Lennox. I think you cannot but remember it, because it would be difficult to find, even among the works of Vandyke, a more striking representation of the youth of our English noblesse; nor one in which the painter had more exerted himself, or with better success, in rendering the decorous pride and natural grace of honourable aristocracy.

Vandyke is, however, inferior to Titian and Velasquez, in that his effort to show this noblesse of air and persons may always be detected; also the aristocracy of Vandyke's day were already so far fearful of their own position as to feel anxiety that it should be immediately recognized. And the effect of the painter's conscious defer-

ence, and of the equally conscious pride of the boys, as they stood to be painted, has been somewhat to shorten the power of the one, and to abase the dignity of the other. And thus, in the midst of my admiration of the youths' beautiful faces, and natural quality of majesty, set off by all splendours of dress and courtesies of art, I could not forbear questioning with myself what the true value was, in the scales of creation, of these fair human beings who set so high a value on themselves; and,—as if the only answer,—the words kept repeating themselves in my ear, “Ye are of more value than many sparrows.”

2. *Passeres, στρουθοι*,—the things that open their wings, and are not otherwise noticeable; small birds of the land and wood; the food of the serpent, of man, or of the stronger creatures of their own kind,—that even these, though among the simplest and obscurest of beings, have yet price in the eyes of their Maker, and that the death of one of them cannot take place but by His permission, has long been the subject of declamation in our pulpits, and the ground of much sentiment in nursery education. But the declamation is so aimless, and the sentiment so hollow, that, practically, the chief interest of the leisure of mankind has been found in the destruction of the creatures which they professed to believe even the Most High would not see perish without pity; and, in recent days, it is fast becoming the only definition of aristocracy, that the principal business of its life is the killing of sparrows.

Sparrows, or pigeons, or partridges, what does it mat-

ter? "Centum mille perdrices plumbo confecit;" * that is, indeed, too often the sum of the life of an English lord; much questionable now, if *indeed* of more value than that of many sparrows.

3. Is it not a strange fact, that, interested in nothing so much for the last two hundred years, as in his horses, he yet left it to the farmers of Scotland to relieve draught horses from the bearing-rein; † is it not one equally strange that, master of the forests of England for a thousand years, and of its libraries for three hundred, he left the natural history of birds to be written by a card-printer's lad of Newcastle? Written, and not written, for indeed we have no natural history of birds written yet. It cannot be written but by a scholar and a gentleman; and no English gentleman in recent times has ever thought of birds except as flying targets, or flavoured dishes. The only piece of natural history worth the name in the English language, that I know of, is in the few lines of Milton on the Creation. The only example of a proper manner of contribution to natural history is in White's Letters from Selborne. You know I have always spoken of Bewick as pre-eminently a vulgar or boorish person, though of splendid honour and genius; his vulgarity shows in nothing so much as in the poverty of the details he has collected, with the best intentions, and the shrewdest

* The epitaph on Count Zachdarm, in "Sartor Resartus."

† Sir Arthur Helps. "Animals and their Masters," p. 67.

sense, for English ornithology. His imagination is not cultivated enough to enable him to choose, or arrange.

4. Nor can much more be said for the observations of modern science. It is vulgar in a far worse way, by its arrogance and materialism. In general, the scientific natural history of a bird consists of four articles,—first, the name and estate of the gentleman whose gamekeeper shot the last that was seen in England; secondly, two or three stories of doubtful origin, printed in every book on the subject of birds for the last fifty years; thirdly, an account of the feathers, from the comb to the rump, with enumeration of the colours which are never more to be seen on the living bird by English eyes; and, lastly, a discussion of the reasons why none of the twelve names which former naturalists have given to the bird are of any further use, and why the present author has given it a thirteenth, which is to be universally, and to the end of time, accepted.

5. You may fancy this is caricature; but the abyss of confusion produced by modern science in nomenclature, and the utter void of the abyss when you plunge into it after any one useful fact, surpass all caricature. I have in my hand thirteen plates of thirteen species of eagles; eagles all, or hawks all, or falcons all—whichever name you choose for the great race of the hook-headed birds of prey—some so like that you can't tell the one from the other, at the distance at which I show them to you, all absolutely alike in their eagle or falcon character, having,

every one, the falx for its beak, and every one, flesh for its prey. Do you suppose the unhappy student is to be allowed to call them all eagles, or all falcons, to begin with, as would be the first condition of a wise nomenclature, establishing resemblance by specific name, before marking variation by individual name? No such luck. I hold you up the plates of the thirteen birds one by one, and read you their names off the back:—

The first	is an Aquila.
The second,	a Haliaetus.
The third,	a Milvus.
The fourth,	a Pandion.
The fifth,	an Astur.
The sixth,	a Falco.
The seventh,	a Pernis.
The eighth,	a Circus.
The ninth,	a Buteo.
The tenth,	an Archibuteo.
The eleventh,	an Accipiter.
The twelfth,	an Erythropus.
And the thirteenth, a Tinnunculus.	

There's a nice little lesson to entertain a parish school-boy with, beginning his natural history of birds!

6. There are not so many varieties of robin as of hawk, but the scientific classifiers are not to be beaten. If they cannot find a number of similar birds to give different names to, they will give two names to the same one. Here are two pictures of your own redbreast, out of the

two best modern works on ornithology. In one, it is called "*Motacilla rubecula*;" in the other, "*Rubecula familiaris*."

7. It is indeed one of the most serious, as one of the most absurd, weaknesses, of modern naturalists to imagine that *any* presently invented nomenclature can stand, even were it adopted by the consent of nations, instead of the conceit of individuals. It will take fifty years' digestion before the recently ascertained elements of natural science can permit the arrangement of species in any permanently (even over a limited period) nameable order; nor then, unless a great man is born to perceive and exhibit such order. In the meantime, the simplest and most descriptive nomenclature is the best. Every one of these birds, for instance, might be called *falco* in Latin, hawk in English, some word being added to distinguish the genus, which should describe its principal aspect or habit. *Falco montium*, Mountain Hawk; *Falco silvarum*, Wood Hawk; *Falco procellarum*, Sea Hawk; and the like. Then, one descriptive epithet would mark species. *Falco montium, aureus*, Golden Eagle; *Falco silvarum, apivorus*, Honey Buzzard; and so on; and the naturalists of Vienna, Paris, and London should confirm the names of known creatures, in conclave, once every half century, and let them so stand for the next fifty years.

8. In the meantime, you yourselves, or, to speak more generally, the young rising scholars of England,—all of you who care for life as well as literature, and for

spirit,—even the poor souls of birds,—as well as lettering of their classes in books,—you, with all care, should cherish the old Saxon-English and Norman-French names of birds, and ascertain them with the most affectionate research—never despising even the rudest or most provincial forms: all of them will, some day or other, give you clue to historical points of interest. Take, for example, the common English name of this low-flying falcon, the most tameable and affectionate of his tribe, and therefore, I suppose, fastest vanishing from field and wood, the buzzard. That name comes from the Latin “buteo,” still retained by the ornithologists; but, in its original form, valueless, to you. But when you get it comfortably corrupted into Provençal “Busac,” (whence gradually the French busard, and our buzzard,) you get from it the delightful compound “busacador,” “adorer of buzzards”—meaning, generally, a sporting person; and then you have Dante’s Bertrand de Born, the first troubadour of war, bearing witness to you how the love of mere hunting and falconry was already, in his day, degrading the military classes, and, so far from being a necessary adjunct of the noble disposition of lover or soldier, was, even to contempt, showing itself separate from both.

“Le ric home, cassador,
M’enneion, e’l buzacador.
Parlan de volada, d’austor,
Ne jamais d’armas, ni d’amor.”

The rich man, the chaser,
Tires me to death ; and the adorer of buzzards.
They talk of covey and hawk,
And never of arms, nor of love.

“Cassador,” of course, afterwards becomes “chassenr,” and “anstor” “vantonr.” But after you have read this, and familiarized your ear with the old word, how differently Milton’s phrase will ring to you,—“Those who thought no better of the Living God than of a buzzard idol,”—and how literal it becomes, when we think of the actual difference between a member of Parliament in Milton’s time, and the Busacador of to-day ;—and all this freshness and value in the reading, observe, come of your keeping the word which great men have used for the bird, instead of letting the anatomists blunder out a new one from their Latin dictionaries.

9. There are not so many nameable varieties, I just now said, of robin as of falcon ; but this is somewhat inaccurately stated. Those thirteen birds represented a very large proportion of the entire group of the birds of prey, which in my sevenfold classification I recommended you to call universally, “hawks.” The robin is only one of the far greater multitude of small birds which live almost indiscriminately on grain or insects, and which I recommended you to call generally “sparrows ;” but of the robin itself, there are two important European varieties—one red-breasted, and the other blue-breasted.

10. You probably, some of you, never heard of the blue-breast; very few, certainly, have seen one alive, and, if alive, certainly not wild in England.

Here is a picture of it, daintily done,* and you can see the pretty blue shield on its breast, perhaps, at this distance. Vain shield, if ever the fair little thing is wretched enough to set foot on English ground! I find the last that was seen was shot at Margate so long ago as 1842,—and there seems to be no official record of any visit before that, since Mr. Thomas Embledon shot one on Newcastle town moor in 1816. But this rarity of visit to us is strange; other birds have no such clear objection to being shot, and really seem to come to England expressly for the purpose. And yet this blue-bird—(one can't say “blue robin”—I think we shall have to call him “bluet,” like the cornflower)—stays in Sweden, where it sings so sweetly that it is called “a hundred tongues.”

11. That, then, is the utmost which the lords of land, and masters of science, do for us in their watch upon our feathered suppliants. One kills them, the other writes classifying epitaphs.

We have next to ask what the poets, painters, and monks have done.

The poets—among whom I affectionately and reverently class the sweet singers of the nursery, mothers and

* Mr. Gould's, in his “Birds of Great Britain.”

nurses—have done much ; very nearly all that I care for your thinking of. The painters and monks, the one being so greatly under the influence of the other, we may for the present class together ; and may almost sum their contributions to ornithology in saying that they have plucked the wings from birds, to make angels of men, and the claws from birds, to make devils of men.

If you were to take away from religious art these two great helps of its—I must say, on the whole, very feeble—imagination ; if you were to take from it, I say, the power of putting wings on shoulders, and claws on fingers and toes, how wonderfully the sphere of its angelic and diabolic characters would be contracted ! Reduced only to the sources of expression in face or movements, you might still find in good early sculpture very sufficient devils ; but the best angels would resolve themselves, I think, into little more than, and not often into so much as, the likenesses of pretty women, with that grave and (I do not say it ironically) majestic expression which they put on, when, being very fond of their husbands and children, they seriously think either the one or the other have misbehaved themselves.

12. And it is not a little discouraging for me, and may well make you doubtful of my right judgment in this endeavour to lead you into closer attention to the bird, with its wings and claws still in its own possession ;—it is discouraging, I say, to observe that the beginning of such more faithful and accurate observation in former art, is

exactly coeval with the commencement of its decline. The feverish and ungraceful natural history of Paul, called, "of the birds," Paolo degli Uccelli, produced, indeed, no harmful result on the minds of his contemporaries; they watched in him, with only contemptuous admiration, the fantasy of zoological instinct which filled his house with painted dogs, cats, and birds, because he was too poor to fill it with real ones. Their judgment of this morbidly naturalistic art was conclusively expressed by the sentence of Donatello, when going one morning into the Old Market, to buy fruit, and finding the animal painter uncovering a picture, which had cost him months of care, (curiously symbolic in its subject, the infidelity of St. Thomas, of the investigatory fingering of the natural historian,) "Paul, my friend," said Donatello, "thou art uncovering the picture just when thou shouldst be shutting it up."

13. No harm, therefore, I repeat, but, on the contrary, some wholesome stimulus to the fancy of men like Luca and Donatello themselves, came of the grotesque and impertinent zoology of Uccello.

But the fatallest institutor of proud modern anatomical and scientific art, and of all that has polluted the dignity, and darkened the charity, of the greater ages, was Antonio Pollajuolo of Florence. Antonio (that is to say) the Poulterer—so named from the trade of his grandfather, and with just so much of his grandfather's trade left in his own disposition, that being set by Lorenzo

Ghiberti to complete one of the ornamental festoons of the gates of the Florentine Baptistery, there, (says Vasari) "Antonio produced a quail, which may still be seen, and is so beautiful, nay, so perfect, that it wants nothing but the power of flight."

14. Here, the morbid tendency was as attractive as it was subtle. Ghiberti himself fell under the influence of it; allowed the borders of his gates, with their flitting birds and bossy fruits, to dispute the spectators' favour with the religious subjects they enclosed; and, from that day forward, minuteness and muscularity were, with curious harmony of evil, delighted in together; and the lancet and the microscope, in the hands of fools, were supposed to be complete substitutes for imagination in the souls of wise men: so that even the best artists are gradually compelled, or beguiled, into compliance with the curiosity of their day; and Francia, in the city of Bologna, is held to be a "kind of god, more particularly" (again I quote Vasari) "after he had painted a set of caparisons for the Duke of Urbino, on which he depicted a great forest all on fire, and whence there rushes forth an immense number of every kind of animal, with several human figures. This terrific, yet truly beautiful representation, was all the more highly esteemed for the time that had been expended on it in the plumage of the birds, and other minutiae in the delineation of the different animals, and in the diversity of the branches and leaves of the various trees

seen therein;" and thenceforward the catastrophe is direct, to the ornithological museums which Breughel painted for gardens of Eden, and to the still life and dead game of Dutch celebrities.

15. And yet I am going to invite you to-day to examine, down to almost microscopic detail, the aspect of a small bird, and to invite you to do this, as a most expedient and sure step in your study of the greatest art.

But the difference in our motive of examination will entirely alter the result. To paint birds that we may show how minutely we can paint, is among the most contemptible occupations of art. To paint them, that we may show how beautiful they are, is not indeed one of its highest, but quite one of its pleasantest and most useful; it is a skill within the reach of every student of average capacity, and which, so far as acquired, will assuredly both make their hearts kinder, and their lives happier.

Without further preamble, I will ask you to look to-day, more carefully than usual, at your well-known favourite, and to think about him with some precision.

16. And first, Where does he come from? I stated that my lectures were to be on English and Greek birds; but we are apt to fancy the robin all our own. How exclusively, do you suppose, he really belongs to us? You would think this was the first point to be settled in any book about him. I have hunted all my books through,

and can't tell you how much he is our own, or how far he is a traveller.

And, indeed, are not all our ideas obscure about migration itself? You are broadly told that a bird travels, and how wonderful it is that it finds its way; but you are scarcely ever told, or led to think, what it really travels for—whether for food, for warmth, or for seclusion—and how the travelling is connected with its fixed home. Birds have not their town and country houses,—their villas in Italy, and shooting boxes in Scotland. The country in which they build their nests is their proper home,—the country, that is to say, in which they pass the spring and summer. Then they go south in the winter, for food and warmth; but in what lines, and by what stages? The general definition of a migrant in this hemisphere is a bird that goes north to build its nest, and south for the winter; but, then, the one essential point to know about it is the breadth and latitude of the zone it properly inhabits,—that is to say, in which it builds its nest; next, its habit of life, and extent and line of southing in the winter; and, finally, its manner of travelling.

17. Now, here is this entirely familiar bird, the robin. Quite the first thing that strikes me about it, looking at it as a painter, is the small effect it seems to have had on the minds of the southern nations. I trace nothing of it definitely, either in the art or literature of Greece or Italy. I find, even, no definite name for it; you don't know if *Lesbia's* "passer" had a red breast, or a blue, or

a brown. And yet Mr. Gould says it is abundant in all parts of Europe, in all the islands of the Mediterranean, and in Madeira and the Azores. And then he says—(now notice the puzzle of this), —“In many parts of the Continent it is a migrant, and, contrary to what obtains with us, is there treated as a vagrant, for there is scarcely a country across the water in which it is not shot down and eaten.”

“In many parts of the Continent it is a migrant.” In what parts—how far—in what manner?

18. In none of the old natural history books can I find any account of the robin as a traveller, but there is, for once, some sufficient reason for their reticence. He has a curious fancy in his manner of travelling. Of all birds, you would think he was likely to do it in the cheerfulest way, and he does it in the saddest. Do you chance to have read, in the *Life of Charles Dickens*, how fond he was of taking long walks in the night and alone? The robin, en voyage, is the Charles Dickens of birds. He always travels in the night, and alone; rests, in the day, wherever day chances to find him; sings a little, and pretends he hasn't been anywhere. He goes as far, in the winter, as the north-west of Africa; and in Lombardy, arrives from the south early in March; but does not stay long, going on into the Alps, where he prefers wooded and wild districts. So, at least, says my Lombard informant.

I do not find him named in the list of Cretan birds;

but even if often seen, his dim red breast was little likely to make much impression on the Greeks, who knew the flamingo, and had made it, under the name of Phoenix or Phœnicopterus, the centre of their myths of scarlet birds. They broadly embraced the general aspect of the smaller and more obscure species, under the term *ξουθος*, which, as I understand their use of it, exactly implies the indescribable silky brown, the groundwork of all other colour in so many small birds, which is indistinct among green leaves, and absolutely identifies itself with dead ones, or with mossy stems.

19. I think I show it you more accurately in the robin's back than I could in any other bird ; its mode of transition into more brilliant colour is, in him, elementarily simple ; and although there is nothing, or rather because there is nothing, in his plumage, of interest like that of tropical birds, or even of our own game-birds, I think it will be desirable for you to learn first from the breast of the robin what a feather is. Once knowing that, thoroughly, we can further learn from the swallow what a wing is ; from the chough what a beak is ; and from the falcon what a claw is.

I must take care, however, in neither of these last two particulars, to do injustice to our little English friend here ; and before we come to his feathers, must ask you to look at his bill and his feet.

20. I do not think it is distinctly enough felt by us that the beak of a bird is not only its mouth, but its hand, or

rather its two hands. For, as its arms and hands are turned into wings, all it has to depend upon, in economical and practical life, is its beak. The beak, therefore, is at once its sword, its carpenter's tool-box, and its dressing-case; partly also its musical instrument; all this besides its function of seizing and preparing the food, in which functions alone it has to be a trap, carving-knife, and teeth, all in one.

21. It is this need of the beak's being a mechanical tool which chiefly regulates the form of a bird's face, as opposed to a four-footed animal's. If the question of food were the only one, we might wonder why there were not more four-footed creatures living on seeds than there are; or why those that do—field-mice and the like—have not beaks instead of teeth. But the fact is that a bird's beak is by no means a perfect eating or food-seizing instrument. A squirrel is far more dexterous with a nut than a cockatoo; and a dog manages a bone incomparably better than an eagle. But the beak has to do so much more! Pruning feathers, building nests, and the incessant discipline in military arts, are all to be thought of, as much as feeding.

Soldiership, especially, is a much more imperious necessity among birds than quadrupeds. Neither lions nor wolves habitually use claws or teeth in contest with their own species; but birds, for their partners, their nests, their hunting-grounds, and their personal dignity, are nearly always in contention; their courage is unequalled

by that of any other race of animals capable of comprehending danger; and their pertinacity and endurance have, in all ages, made them an example to the brave, and an amusement to the base, among mankind.

22. Nevertheless, since as sword, as trowel, or as pocket-comb, the beak of the bird has to be pointed, the collection of seeds may be conveniently entrusted to this otherwise penetrative instrument, and such food as can only be obtained by probing crevices, splitting open fissures, or neatly and minutely picking things up, is allotted, pre-eminently, to the bird species.

The food of the robin, as you know, is very miscellaneous. Linnaeus says of the Swedish one, that it is "*delectatus euonymi baccis*,"—"delighted with dogwood berries,"—the dogwood growing abundantly in Sweden, as once in Forfarshire, where it grew, though only a bush usually in the south, with trunks a foot or eighteen inches in diameter, and the tree thirty feet high. But the Swedish robin's taste for its berries is to be noted by you, because, first, the dogwood berry is commonly said to be so bitter that it is not eaten by birds (London, "*Arboretum*," ii., 497, 1.); and, secondly, because it is a pretty coincidence that this most familiar of household birds should feed fondly from the tree which gives the housewife her spindle,—the proper name of the dogwood in English, French, and German being alike "*Spindle-tree*." It feeds, however, with us, certainly, most on worms and insects. I am not sure how far the following account of

its mode of dressing its dinners may be depended on : I take it from an old book on Natural History, but find it, more or less, confirmed by others : "It takes a worm by one extremity in its beak, and beats it on the ground till the inner part comes away. Then seizing it in a similar manner by the other end, it entirely cleanses the outer part, which alone it eats."

One's first impression is that this must be a singularly unpleasant operation for the worm, however fastidiously delicate and exemplary in the robin. But I suppose the real meaning is, that as a worm lives by passing earth through its body, the robin merely compels it to quit this—not ill-gotten, indeed, but now quite unnecessary—wealth. We human creatures, who have lived the lives of worms, collecting dust, are served by Death in exactly the same manner.

23. You will find that the robin's beak, then, is a very prettily representative one of general bird power. As a weapon, it is very formidable indeed ; he can kill an adversary of his own kind with one blow of it in the throat ; and is so pugnacious, "*valde pugnax*," says Linuæus, "*ut non una arbor duos capiat erithacos*,"—"no single tree can hold two cock-robins ;" and for precision of seizure, the little flat hook at the end of the upper mandible is one of the most delicately formed points of forceps which you can find among the grain eaters. But I pass to one of his more special perfections.

24. He is very notable in the exquisite silence and pre-

cision of his movements, as opposed to birds who either creak in flying, or waddle in walking. "Always quiet," says Gould, 'for the silkiness, of his plumage renders his movements noiseless, and the rustling of his wings is never heard, any more than his tread on earth, over which he bounds with amazing sprightliness." You know how much importance I have always given, among the fin-arts, to good dancing. If you think of it, you will find one of the robin's very chief ingratiatory faculties is his dainty and delicate movement,—his footing it featly here and there. Whatever prettiness there may be in his red breast, at his brightest he can always be outshone by a brickbat. But if he is rationally proud of anything about him, I should think a robin must be proud of his legs. Hundreds of birds have longer and more imposing ones—but for real neatness, finish, and precision of action, commend me to his fine little ankles, and fine little feet; this long stilted process, as you know, corresponding to our ankle-bone. Commend me, I say, to the robin for use of his ankles—he is, of all birds, the pre-eminent and characteristic Hopper; none other so light, so pert, or so swift.

25. We must not, however, give too much credit to his legs in this matter. A robin's hop is half a flight; he hops, very essentially, with wings and tail, as well as with his feet, and the exquisitely rapid opening and quivering of the tail-feathers certainly give half the force to his leap. It is in this action that he is put among the mota-

cillae, or wagtails; but the ornithologists have no real business to put him among them. The swing of the long tail-feathers in the true wagtail is entirely consequent on its motion, not impulsive of it—the tremulous shake is *after* alighting. But the robin leaps with wing, tail, and foot, all in time, and all helping each other. Leaps, I say; and you check at the word; and ought to check: you look at a bird hopping, and the motion is so much a matter of course, you never think how it is done. But do you think you would find it easy to hop like a robin if you had two—all but wooden—legs, like this?

26. I have looked wholly in vain through all my books on birds, to find some account of the muscles it uses in hopping, and of the part of the toes with which the spring is given. I must leave you to find out that for yourselves; it is a little bit of anatomy which I think it highly desirable for you to know, but which it is not my business to teach you. Only observe, this is the point to be made out. You leap yourselves, with the toe and ball of the foot; but, in that power of leaping, you lose the faculty of grasp; on the contrary, with your hands, you grasp as a bird with its feet. But you cannot hop on your hands. A cat, a leopard, and a monkey, leap or grasp with equal ease; but the action of their paws in leaping is, I imagine, from the fleshy ball of the foot; while in the bird, characteristically γαμψώνυξ, this fleshy ball is reduced to a boss or series of bosses, and the nails are elongated into sickles or horns; nor does the springing power seem

to depend on the development of the bosses. They are far more developed in an eagle than a robin; but you know how unpardonably and preposterously awkward an eagle is when he hops. When they are most of all developed, the bird walks, runs, and digs well, but leaps badly.

27. I have no time to speak of the various forms of the ankle itself, or of the scales of armour, more apparent than real, by which the foot and ankle are protected. The use of this lecture is not either to describe or to exhibit these varieties to you, but so to awaken your attention to the real points of character, that, when you have a bird's foot to draw, you may do so with intelligence and pleasure, knowing whether you want to express force, grasp, or firm ground pressure, or dexterity and tact in motion. And as the actions of the foot and the hand in man are made by every great painter perfectly expressive of the character of mind, so the expressions of rapacity, cruelty, or force of seizure, in the harpy, the gryphon, and the hooked and clawed evil spirits of early religious art, can only be felt by extreme attention to the original form.

28. And now I return to our main question, for the robin's breast to answer, "What is a feather?" You know something about it already; that it is composed of a quill, with its lateral filaments, terminating generally, more or less, in a point; that these extremities of the quills, lying over each other like the tiles of a house, allow the wind and rain to pass over them with the least possible resistance, and form a protection alike from the

heat and the cold ; which, in structure much resembling the scale-armour assumed by man for very different objects, is, in fact, intermediate, exactly, between the fur of beasts and the scales of fishes ; having the minute division of the one, and the armour-like symmetry and succession of the other.

29. Not merely symmetry, observe, but extreme flatness. Feathers are smoothed down, as a field of corn by wind with rain ; only the swathes laid in beautiful order. They are fur, so structurally placed as to imply, and submit to, the perpetually swift forward motion. In fact, I have no doubt the Darwinian theory on the subject is that the feathers of birds once stuck up all erect, like the bristles of a brush, and have only been blown flat by continual flying.

Nay, we might even sufficiently represent the general manner of conclusion in the Darwinian system by the statement that if you fasten a hair-brush to a mill-wheel, with the handle forward, so as to develop itself into a neck by moving always in the same direction, and within continual hearing of a steam-whistle, after a certain number of revolutions the hair-brush will fall in love with the whistle ; they will marry, lay an egg, and the produce will be a nightingale.

30. Whether, however, a hog's bristle can turn into a feather or not, it is vital that you should know the present difference between them.

The scientific people will tell you that a feather is com-

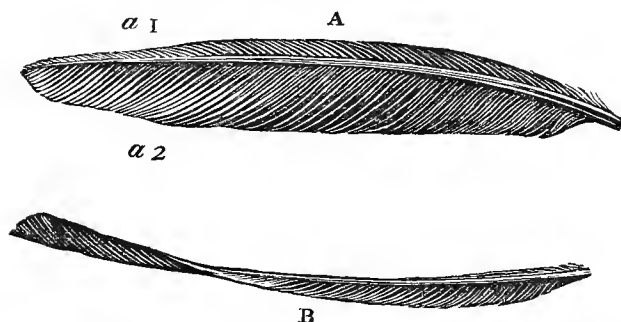
posed of three parts—the down, the laminae, and the shaft.

But the common-sense method of stating the matter is that a feather is composed of two parts, a shaft with lateral filaments. For the greater part of the shaft's length, these filaments are strong and nearly straight, forming, by their attachment, a finely warped sail, like that of a windmill. But towards the root of the feather they suddenly become weak, and confusedly flexible, and form the close down which immediately protects the bird's body.

To show you the typical arrangement of these parts, I choose, as I have said, the robin ; because, both in his power of flying, and in his colour, he is a moderate and balanced

FIG. 1.

(Twice the size of reality.)



bird ;—not turned into nothing but wings, like a swallow, or nothing but neck and tail, like a peacock. And first

for his flying power. There is one of the long feathers of robin's wing, and here (Fig. 1) the analysis of its form.

31. First, in pure outline (Δ), seen from above, it is very nearly a long oval, but with this peculiarity, that it has, as it were, projecting shoulders at a 1 and a 2. I merely desire you to observe this, in passing, because one usually thinks of the contour as sweeping unbroken from the root to the point. I have not time to-day to enter on any discussion of the reason for it, which will appear when we examine the placing of the wing-feathers for their stroke.

Now, I hope you are getting accustomed to the general method in which I give you the analysis of all forms—leaf, or feather, or shell, or limb. First, the plan; then the profile; then the cross-section.

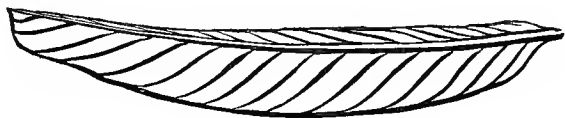
I take next, the profile of my feather (B , Fig. 1), and find that it is twisted as the sail of a windmill is, but more distinctly, so that you can always see the upper surface of the feather at its root, and the under at its end. Every primary wing-feather, in the fine flyers, is thus twisted; and is best described as a sail striking with the power of a scymitar, but with the flat instead of the edge.

32. Further, you remember that on the edges of the broad side of feathers you find always a series of undulations, irregularly sequent, and lapping over each other like waves on sand. You might at first imagine that this

appearance was owing to a slight ruffling or disorder of the filaments; but it is entirely normal, and, I doubt not, so constructed, in order to ensure a redundancy of material in the plume, so that no accident or pressure from wind may leave a gap anywhere. How this redundancy is obtained you will see in a moment by bending any feather the wrong way. Bend, for instance, this plume, B,

FIG. 2.

A



B



Fig. 2, into the reversed curve, A, Fig. 2; then all the filaments of the plume become perfectly even, and there are no waves at the edge. But let the plume return into its proper form, B, and the tissue being now contracted into a smaller space, the edge waves are formed in it instantly.

Hitherto, I have been speaking only of the filaments arranged for the strength and continuity of the energetic plume; they are entirely different when they are set

together for decoration instead of force. After the feather of the robin's wing, let us examine one from his breast.

33. I said, just now, he might be at once outshone by a brickbat. Indeed, the day before yesterday, sleeping at Lichfield, and seeing, the first thing when I woke in the morning, (for I never put down the blinds of my bedroom windows,) the not uncommon sight in an English country town of an entire house-front of very neat, and very flat, and very red bricks, with very exactly squared square windows in it; and not feeling myself in anywise gratified or improved by the spectacle, I was thinking how in this, as in all other good, the too much destroyed all. The breadth of a robin's breast in brick-red is delicious, but a whole house-front of brick-red as vivid, is alarming. And yet one cannot generalize even that trite moral with any safety—for infinite breadth of green is delightful, however green; and of sea or sky, however blue.

You must note, however, that the robin's charm is greatly helped by the pretty space of grey plumage which separates the red from the brown back, and sets it off to its best advantage. There is no great brilliancy in it, even so relieved; only the finish of it is exquisite.

34. If you separate a single feather, you will find it more like a transparent hollow shell than a feather (so delicately rounded the surface of it),—grey at the root, where the down is,—tinged, and only tinged, with red at the part that overlaps and is visible; so that, when three

or four more feathers have overlapped it again, all together, with their joined red, are just enough to give the colour determined upon, each of them contributing a tinge. There are about thirty of these glowing filaments on each side, (the whole being no larger across than a well-grown currant,) and each of these is itself another exquisite feather, with central quill and lateral webs, whose filaments are not to be counted.

The extremity of these breast plumes parts slightly into two, as you see in the peacock's, and many other such decorative ones. The transition from the entirely leaf-like shape of the active plume, with its oblique point, to the more or less symmetrical dualism of the decorative plume, corresponds with the change from the pointed green leaf to the dual, or heart-shaped, petal of many flowers. I shall return to this part of our subject, having given you, I believe, enough of detail for the present.

35. I have said nothing to-day of the mythology of the bird, though I told you that would always be, for us, the most important part of its natural history. But I am obliged, sometimes, to take what we immediately want, rather than what, ultimately, we shall need chiefly. In the second place, you probably, most of you, know more of the mythology of the robin than I do, for the stories about it are all northern, and I know scarcely any myths but the Italian and Greek. You will find under the name "Robin," in Miss Yonge's exhaustive and admirable "History of Christian Names," the various titles of hon-

our and endearment connected with him, and with the general idea of redness,—from the bishop called “Bright Red Fame,” who founded the first great Christian church on the Rhine, (I am afraid of your thinking I mean a pun, in connection with robins, if I tell you the locality of it,) down through the Hoods, and Roys, and Grays, to Robin Goodfellow, and Spenser’s “Hobbinol,” and our modern “Hob,”—joining on to the “goblin,” which comes from the old Greek *Κόβαλος*. But I cannot let you go without asking you to compare the English and French feeling about small birds, in Chaucer’s time, with our own on the same subject. I say English and French, because the original French of the Romance of the Rose shows more affection for birds than even Chaucer’s translation, passionate as he is, always, in love for any one of his little winged brothers or sisters. Look, however, either in the French or English, at the description of the coming of the God of Love, leading his carol-dance, in the garden of the Rose.

His dress is embroidered with figures of flowers and of beasts ; but about him fly the *living* birds. The French is :

Il etoit tout couvert d’oisiaux
 De rossignols et de papegaux
 De calendre, et de mesangel.
 Il semblaît que ce fut une angle
 Qui fuz tout droit venuz du ciel

36. There are several points of philology in this transitional French, and in Chaucer’s translation, which it is

well worth your patience to observe. The monkish Latin "angelus," you see, is passing through the very unpoetical form "angle," into "ange;" but, in order to get a rhyme with it in that angular form, the French troubadour expands the bird's name, "mesange," quite arbitrarily, into "mesangel." Then Chaucer, not liking the "mes" at the beginning of the word, changes that unscrupulously into "arch;" and gathers in, though too shortly, a lovely bit from another place about the nightingales flying so close round Love's head that they strike some of the leaves off his crown of roses; so that the English runs thus:

But nightingales, a full great rout
That flien over his head about,
The leaves felden as they flien
And he was all with birds wrien,
With popinjay, with nightingale,
With chelaundre, and with wodewale,
With finch, with lark, and with archangel.
He seemed as he were an angell,
That down were comen from Heaven clear.

Now, when I first read this bit of Chaucer, without referring to the original, I was greatly delighted to find that there was a bird in his time called an archangel, and set to work, with brightly hopeful industry, to find out what it was. I was a little discomfited by finding that in old botany the word only meant "dead-nettle," but was still sanguine about my bird, till I found the French form descend, as you have seen, into a mesangel, and finally into mesange, which is a provincialism from *μελον*

and means, the smallest of birds—or, specially here,—a titmouse. I have seldom had a less expected or more ignominious fall from the clouds.

37. The other birds, named here and in the previous description of the garden, are introduced, as far as I can judge, nearly at random, and with no precision of imagination like that of Aristophanes; but with a sweet childish delight in crowding as many birds as possible into the smallest space. The popinjay is always prominent; and I want some of you to help me (for I have not time at present for the chase) in hunting the parrot down on his first appearance in Enrope. Just at this particular time he contested favour even with the falcon; and I think it a piece of good fortune that I chanced to draw for you, thinking only of its brilliant colour, the popinjay, which Carpaccio allows to be present on the grave occasion of St. George's baptizing the princess and her father.

38. And, indeed, as soon as the Christian poets begin to speak of the singing of the birds, they show themselves in quite a different mood from any that ever occurs to a Greek. Aristophanes, with infinitely more skill, describes, and partly imitates, the singing of the nightingale; but simply as beautiful sound. It "fills the thickets with honey;" and if in the often-quoted—just because it is *not* characteristic of Greek literature—passage of the Coloneus, a deeper sentiment is shown, that feeling is dependent on association of the bird-voices with deeply pathetic circumstances. But this troubadour

finds his heart in heaven by the power of the singing only:—

Trop parfoisaient beau service
Ciz oiselles que je vous devise.
Il chantaient un chant ytel
Com fussent angle esperitel.

We want a moment more of word-chasing to enjoy this. “Oiseau,” as you know, comes from “avis;” but it had at this time got “oisel” for its singular number, of which the terminating “sel” confused itself with the “selle,” from “ancilla” in domisella and demoiselle; and the feminine form “oiselle” thus snatched for itself some of the delightfulness belonging to the title of a young lady. Then note that “esperitel” does not here mean merely spiritual, (because all angels are spiritual,) but an “angle esperitel” is an angel of the air. So that, in English, we could only express the meaning in some such fashion as this:—

They perfected all their service of Love,
These maiden birds that I tell you of.
They sang such a song, so finished-fair,
As if they were angels, born of the air.

39. Such were the fancies, then, and the scenes, in which Englishmen took delight in Chancer’s time. England was then a simple country; we boasted, for the best kind of riches, our birds and trees, and our wives and children. We have now grown to be a rich one; and our first pleasure is in shooting our birds; but it has become too expensive for us to keep our trees. Lord Derby,

whose crest is the eagle and child—you will find the northern name for it, the bird and bantling, made classical by Scott—is the first to propose that wood-birds should have no more nests. We must cut down all our trees, he says, that we may effectively use the steam-plough; and the effect of the steam-plough, I find by a recent article in the “Cornhill Magazine,” is that an English labourer must not any more have a nest, nor bantlings, neither; but may only expect to get on prosperously in life, if he be perfectly skilful, sober, and honest, and dispenses, at least until he is forty-five, with the “luxury of marriage.”

40. Gentlemen, you may perhaps have heard me blamed for making no effort here to teach in the artizans' schools. But I can only say that, since the future life of the English labourer or artizan (summing the benefits to him of recent philosophy and economy) is to be passed in a country without angels and without birds, without prayers and without songs, without trees and without flowers, in a state of exemplary sobriety, and (extending the Catholic celibacy of the clergy into celibacy of the laity) in a state of dispensation with the luxury of marriage, I do not believe he will derive either profit or entertainment from lectures on the Fine Arts.

LECTURE II.

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THE SWALLOW.

41. WE are to-day to take note of the form of a creature which gives us a singular example of the unity of what artists call beauty, with the fineness of mechanical structure, often mistaken for it. You cannot but have noticed how little, during the years of my past professorship, I have introduced any questions as to the nature of beauty. I avoided them, partly because they are treated of at length in my books ; and partly because they are, in the last degree, unpractical. We are born to like or dislike certain aspects of things ; nor could I, by any arguments, alter the defined tastes which you received at your birth, and which the surrounding circumstances of life have enforced, without any possibility of your voluntary resistance to them. And the result of those surrounding circumstances, to-day, is that most English youths would have more pleasure in looking at a locomotive than at a swallow ; and that many English philosophers would suppose the pleasure so received to be through a new sense of beauty. But the meaning of the word "beauty" in the fine arts, and in classical literature, is properly restricted to those very qualities in which

the locomotion of a swallow differs from that of an engine.

42. Not only from that of an engine; but also from that of animals in whose members the mechanism is so complex as to give them a resemblance to engines. The dart of the common house-fly, for instance, in full strength, is a more wonderful movement than that of a swallow. The mechanism of it is not only more minute, but the swiftness of the action so much greater, that the vibration of the wing is invisible. But though a school-boy might prefer the locomotive to the swallow, he would not carry his admiration of finely mechanical velocity into unqualified sympathy with the workmanship of the God of Ekron; and would generally suppose that flies were made only to be food for the more graceful fly-catcher,—whose finer grace you will discover, upon reflection, to be owing to the very moderation and simplicity of its structure, and to the subduing of that infinitude of joints, claws, tissues, veins, and fibres which inconceivably vibrate in the microscopic * creature's motion, to a quite intelligible and simple balance of rounded body upon edged plume, maintained not without visible, and sometimes fatigued, exertion, and raising the lower creature into fellowship with the volition and the virtue of humanity.

* I call it so because the members and action of it cannot be seen with the unaided eye.

43. With the virtue, I say, in an exceedingly qualified sense ; meaning rather the strength and art displayed in overcoming difficulties, than any distinct morality of disposition. The bird has kindly and homely qualities ; but its principal "virtue," for *us*, is its being an incarnate voracity, and that it moves as a consuming and cleansing power. You sometimes hear it said of a humane person that he would not kill a fly : from 700 to 1000 flies a day are a moderate allowance for a baby swallow.

44. Perhaps, as I say this, it may occur to some of you to think, for the first time, of the reason of the bird's name. For it is very interesting, as a piece of language study, to consider the different power on our minds,—nay the different sweetness to the ear,—which, from association, these same two syllables receive, when we read them as a noun, or as a verb. Also, the word is a curious instance of the traps which are continually open for rash etymologists. At first, nothing would appear more natural than that the name should have been given to the bird from its reckless function of devouring. But if you look to your Johnson, you will find, to your better satisfaction, that the name means "bird of porticos," or porches, from the Gothic "swale ;" "subdivale,"—so that it goes back in thought as far as Virgil's, "*Et nunc porticibus vacuis, nunc humida circum, stagna sonat.*" Notice, in passing, how a simile of Virgil's, or any other great master's, will probably tell in two or more ways at once. *Juturna* is compared to the swallow, not merely as

winding and turning swiftly in her chariot, but as being a water-nymph by birth,—“*Stagnis quae, fluminibusque sonoris, praesidet.*” How many different creatures in one the swallow is by birth, as a Virgilian simile is many thoughts in one, it would take many more lectures than one to show you clearly; but I will indicate them with such rough sketch as is possible.

45. It belongs, as most of you know, to a family of birds called *Fissi-rostres*, or, literally, split-beaks. Split heads would be a better term, for it is the enormous width of mouth and power of gaping which the epithet is meant to express. A dull sermon, for instance, makes half the congregation “*fissi-rostres*.” The bird, however, is most vigilant when its mouth is widest, for it opens as a net to catch whatever comes in its way,—hence the French, giving the whole family the more literal name, “Gobble-fly”—*Gobe-mouche*, extend the term to the open-mouthed and too acceptant appearance of a simpleton.

46. Partly in order to provide for this width of mouth, but more for the advantage in flight, the head of the swallow is rounded into a bullet shape, and sunk down on the shoulders, with no neck whatever between, so as to give nearly the aspect of a conical rifle bullet to the entire front of the body; and, indeed, the bird moves more like a bullet than an arrow—dependent on a certain impetus of weight rather than on sharp penetration of the air. I say dependent on, but I have not yet been able to trace

distinct relation between the shapes of birds and their powers of flight. I suppose the form of the body is first determined by the general habits and food, and that nature can make any form she chooses volatile ; only one point I think is always notable, that a complete master of the art of flight must be short-necked, so that he turns altogether, if he turns at all. You don't expect a swallow to look round a corner before he goes round it ; he must take his chance. The main point is, that he may be able to stop himself, and turn, in a moment.

47. The stopping, on any terms, is difficult enough to understand ; nor less so, the original gaining of the pace. We always think of flight as if the main difficulty of it were only in keeping up in the air ;—but the buoyancy is conceivable enough, the far more wonderful matter is the getting along. You find it hard work to row yourself at anything like speed, though your impulse-stroke is given in a heavy element, and your return-stroke in a light one. But both in birds and fishes, the impelling stroke and its return are in the same element ; and if, for the bird, that medium yields easily to its impulse, it secedes as easily from the blow that gives it. And if you think what an effort you make to leap six feet, with the earth for a fulcrum, the dart either of a trout or a swallow, with no fulcrum but the water and air they penetrate, will seem to you, I think, greatly marvellous. Yet of the mode in which it is accomplished you will as yet find no undisputed account in any book on natural history, and

scarcely, as far as I know, definite notice even of the rate of flight. What do you suppose it is? We are apt to think of the migration of a swallow, as we should ourselves of a serious journey. How long, do you think, it would take him, if he flew uninterruptedly, to get from here to Africa?

48. Michelet gives the rate of his flight (at full speed, of course,) as eighty leagues an hour. I find no more sound authority; but do not doubt his approximate accuracy;* still how curious and how provoking it is that neither White of Selborne, Bewick, Yarrell, nor Gould, says a word about this, one should have thought the most interesting, power of the bird.†

Taking Michelet's estimate—eighty French leagues, roughly two hundred and fifty miles, an hour—we have a thousand miles in four hours. That is to say, leaving Devonshire after an early breakfast, he could be in Africa to lunch.

49. He could, I say, if his flight were constant; but though there is much inconsistency in the accounts, the sum of testimony seems definite that the swallow is among the most fatiguable of birds. “When the weather is

* I wrote this some time ago, and the endeavour I have since made to verify statements on points of natural history which I had taken on trust have given me reason to doubt everybody's accuracy. The ordinary flight of the swallow does not, assuredly, even in the dashes, reach anything like this speed.

† Incidentally suggestive sentences occur in the history of Selborne, but its author never comes to the point, in this case.

hazy," (I quote Yarrell) "they will alight on fishing-boats a league or two from land, so tired that when any one tries to catch them, they can scarcely fly from one end of the boat to the other."

I have no time to read to you the interesting evidence on this point given by Yarrell, but only that of the brother of White of Selborne, at Gibraltar. "My brother has always found," he himself writes, "that some of his birds, and particularly the swallow kind, are very sparing of their pains in crossing the Mediterranean; for when arrived at Gibraltar, they do not 'set forth their airy caravan, high over seas,' but scout and hurry along in little detached parties of six or seven in a company; and sweeping low, just over the surface of the land and water, direct their course to the opposite continent at the narrowest passage they can find."

50. You will observe, however, that it remains an open question whether this fear of the sea may not be, in the swallow, like ours of the desert. The commissariat department is a serious one for birds that eat a thousand flies a day when just out of the egg; and it is possible that the weariness of swallows at sea may depend much more on fasting than flying. Captain (or Admiral?) Sir Charles Wager says that "one spring-time, as he came into soundings in the English Channel, a great flock of swallows came and settled on all his rigging; every rope was covered; they hung on one another like a swarm of bees; even the decks were filled with them. They seemed

almost famished and spent, and were only feathers and bone ; but, being recruited with a night's rest, took their flight in the morning."

51. Now I detain you on this point somewhat, because it is intimately connected with a more important one. I told you we should learn from the swallow what a wing was. Few other birds approach him in the beauty of it, or apparent power. And yet, after all this care taken about it, he gets tired ; and instead of flying, as we should do in his place, all over the world, and tasting the flavour of the midges in every marsh which the infinitude of human folly has left to breed gnats instead of growing corn,—he is of all birds, characteristically, except when he absolutely can't help it, the stayer at home ; and contentedly lodges himself and his family in an old chimney, when he might be flying all over the world.

At least you would think, if he built in an English chimney this year, he would build in a French one next. But no. Michelet prettily says of him, "He is the bird of return." If you will only treat him kindly, year after year, he comes back to the same niche, and to the same hearth, for his nest.'

To the same niche ; and builds himself an opaque walled house within that. Think of this a little, as if you heard of it for the first time.

52. Suppose you had never seen a swallow ; but that its general habit of life had been described to you, and you had been asked, how you thought such a bird would build

its nest. A creature, observe, whose life is to be passed in the air; whose beak and throat are shaped with the fineness of a net for the catching of gnats; and whose feet, in the most perfect of the species, are so feeble that it is called the Footless Swallow, and cannot stand a moment on the ground with comfort. Of all land birds, the one that has least to do with the earth; of all, the least disposed, and the least able, to stop to pick anything up. What will it build with? Gossamer, we should say,—thistledown,—anything it can catch floating, like flies.

But it builds with stiff clay.

53. And observe its chosen place for building also. You would think, by its play in the air, that not only of all birds, but of all creatures, it most delighted in space and freedom. You would fancy its notion of the place for a nest would be the openest field it could find; that anything like confinement would be an agony to it; that it would almost expire of horror at the sight of a black hole.

And its favourite home is down a chimney.

54. Not for your hearth's sake, nor for your company's. Do not think it. The bird will love you if you treat it kindly; is as frank and friendly as bird can be; but it does not, more than others, seek your society. It comes to your house because in no wild wood, nor rough rock, can it find a cavity close enough to please it. It comes for the blessedness of imprisonment, and the solemnity

of an unbroken and constant shadow, in the tower, or under the eaves.

Do you suppose that this is part of its necessary economy, and that a swallow could not catch flies unless it lived in a hole?

Not so. This instinct is part of its brotherhood with another race of creatures. It is given to complete a mesh in the reticulation of the orders of life.

55. I have already given you several reasons for my wish that you should retain, in classifying birds, the now rejected order of Picae. I am going to read you a passage from Humboldt, which shows you what difficulties one may get into for want of it.

You will find in the second volume of his personal narrative, an account of the cave of Caripe in New Andalusia, which is inhabited by entirely nocturnal birds, having the gaping mouths of the goat-sucker and the swallow, and yet feeding on fruit.

Unless, which Mr. Humboldt does not tell us, they sit under the trees outside, in the night time, and hold their mouths open, for the berries to drop into, there is not the smallest occasion for their having wide mouths, like swallows. Still less is there any need, since they are fruit eaters, for their living in a cavern 1,500 feet out of daylight. They have only, in consequence, the trouble of carrying in the seeds to feed their young, and the floor of the cave is thus covered, by the seeds they let fall, with a growth of unfortunate pale plants, which have never seen

day. Nay, they are not even content with the darkness of their cave; but build their nests in the funnels with which the roof of the grotto is pierced like a sieve; live actually in the chimney, not of a house, but of an Egyptian sepulchre! The colour of this bird, of so remarkable taste in lodging, Humboldt tells us, is "of dark bluish-grey, mixed with streaks and specks of black. Large white spots, which have the form of a heart, and which are bordered with black, mark the head, the wings, and the tail. The spread of the wings, which are composed of seventeen or eighteen quill feathers, is three feet and a half. Suppressing, with Mr. Cuvier, the order of *Picae*, we must refer this extraordinary bird to the *Sparrows*."

56. We can only suppose that it must be, to our popular sparrows, what the swallow of the cinnamon country is to our subordinate swallow. Do you recollect the cinnamon swallows of Herodotus, who build their mud nests in the faces of the cliffs where Dionusos was brought up, and where nobody can get near them; and how the cinnamon merchants fetch them joints of meat, which the unadvised birds, flying up to their nests with, instead of cinnamon,—nest and all come down together,—the original of Sindbad's valley-of-diamond story?

57. Well, Humboldt is reduced, by necessities of recent classification, to call a bird three feet and a half across the wings, a sparrow. I have no right to laugh at him, for I am just going, myself, to call the cheerfullest and bright-

est of birds of the air, an owl. All these architectural and sepulchral habits, these Egyptian manners of the sand-martin, digging caves in the sand, and border-trooper's habits of the chimney swallow, living in round towers instead of open air, belong to them as connected with the tribe of the falcons through the owls! and not only so, but with the mammalia through the bats! A swallow is an emancipated owl, and a glorified bat; but it never forgets its fellowship with night.

58. Its *ancient* fellowship, I had nearly written; so natural is it to think of these similarly-minded creatures, when the feelings that both show are evidently useless to one of them, as if the inferior had changed into the higher. The doctrine of development seems at first to explain all so pleasantly, that the scream of consent with which it has been accepted by men of science, and the shriller vociferation of the public's gregarious applause, scarcely permit you the power of antagonist reflection. I must justify to-day, in graver tone than usual, the terms in which I have hitherto spoken,—it may have been thought with less than the due respect to my audience,—of the popular theory.

59. Supposing that the octohedrons of galena, of gold, and of oxide of iron, were endowed with powers of reproduction, and perished at appointed dates of dissolution or solution, you would without any doubt have heard it by this time asserted that the octohedric form, which was common to all, indicated their descent from a common

progenitor ; and it would have been ingeniously explained to you how the angular offspring of this eight-sided ancestor had developed themselves, by force of circumstances, into their distinct metallic perfections ; how the galena had become grey and brittle under prolonged subterranean heat, and the gold yellow and ductile, as it was rolled among the pebbles of amber-coloured streams.

60. By the denial to these structures of any individually reproductive energy, you are forced to accept the inexplicable (and why expect it to be otherwise than inexplicable ?) fact, of the formation of a series of bodies having very similar aspects, qualities, and chemical relations to other substances, which yet have no connection whatever with each other, and are governed, in their relation with their native rocks, by entirely arbitrary laws. It has been the pride of modern chemistry to extricate herself from the vanity of the alchemist, and to admit, with resignation, the independent, though apparently fraternal, natures, of silver, of lead, of platinum,—aluminium,—potassium. Hence, a rational philosophy would deduce the probability that when the arborescence of dead crystallization rose into the radiation of the living tree, and sentient plume, the splendour of nature in her more exalted power would not be restricted to a less variety of design ; and the beautiful caprice in which she gave to the silver its frost, and to the opal its fire, would not be subdued under the slow influences of accident and

time, when she wreathed the swan with snow, and bathed the dove in iridescence. That the infinitely more exalted powers of life must exercise more intimate influence over matter than the reckless forces of cohesion;—and that the loves and hatreds of the now conscious creatures would modify their forms into parallel beauty and degradation, we might have anticipated by reason, and we ought long since to have known by observation. But this law of its spirit over the substance of the creature involves, necessarily, the indistinctness of its type, and the existence of inferior and of higher conditions, which whole æras of heroism and affection—whole æras of misery and misconduct, confirm into glory, or confuse into shame. Collecting the causes of changed form, in lower creatures, by distress, or by adaptation,—by the disturbance or intensifying of the parental strength, and the native fortune—the wonder is, not that species should sometimes be confused, but that the greater number of them remain so splendidly, so manifestly, so eternally distinct; and that the vile industries and vicious curiosities of modern science, while they have robbed the fields of England of a thousand living creatures, have not created in them one.

61. But even in the paltry knowledge we have obtained, what unanimity have we?—what security? Suppose any man of ordinary sense, knowing the value of time, and the relative importance of subjects of thought, and that the whole scientific world was agog concerning

the origin of species, desired to know first of all—what was meant by a species.

He would naturally look for the definition of species first among the higher animals, and expect it to be best defined in those which were best known. And being referred for satisfaction to the 226th page of the first volume of Mr. Darwin's "Descent of Man," he would find this passage:—

"Man has been studied more carefully than any other organic being, and yet there is the greatest possible diversity among capable judges, whether he should be classed as a single species or race, or as two (Virey), as three (Jacquinot), as four (Kant), five (Blumenbach), six (Buffon), seven (Hunter), eight (Agassiz), eleven (Pickering), fifteen (Bory St. Vincent), sixteen (Desmoulins), twenty-two (Morton), sixty (Crawford), or as sixty-three according to Burke."

And in the meantime, while your men of science are thus vacillating, in the definition of the species of the only animal they have the opportunity of studying inside and out, between one and sixty-three; and disputing about the origin, in past ages, of what they cannot define in the present one; and deciphering the filthy heraldries which record the relation of humanity to the ascidian and the crocodile, you have ceased utterly to distinguish between the two species of man, evermore separate by infinite separation: of whom the one, capable of loyalty and of love, can at least conceive spiritual natures which have no

taint from their own, and leave behind them, diffused among thousands on earth, the happiness they never hoped, for themselves, in the skies; and the other, capable only of avarice, hatred, and shame, who in their lives are the companions of the swine, and leave in death nothing but food for the worm and the vulture.

62. Now I have first traced for you the relations of the creature we are examining to those beneath it and above, to the bat and to the falcon. But you will find that it has still others to entirely another world. As you watch it glance and skim over the surface of the waters, has it never struck you what relation it bears to the creatures that glance and glide *under* their surface? Fly-catchers, some of them, also,—fly-catchers in the same manner, with wide mouth; while in motion the bird almost exactly combines the dart of the trout with the dash of the dolphin, to the rounded forehead and projecting muzzle of which its own bullet head and bill exactly correspond. In its plunge, if you watch it bathing, you may see it dip its breast just as much under the water as a porpoise shows its back above. You can only rightly describe the bird by the resemblances, and images of what it seems to have changed from,—then adding the fantastic and beautiful contrast of the unimaginable change. It is an owl that has been trained by the Graces. It is a bat that loves the morning light. It is the aerial reflection of a dolphin. It is the tender domestication of a trout.

63. And yet be assured, as it cannot have been all these creatures, so it has never, in truth, been any of them. The transformations believed in by the mythologists are at least spiritually true ; you cannot too carefully trace or too accurately consider them. But the transformations believed in by the anatomist are as yet proved true in no single instance, and in no substance, spiritual or material ; and I cannot too often, or too earnestly, urge you not to waste your time in guessing what animals may once have been, while you remain in nearly total ignorance of what they are.

64. Do you even know distinctly from each other,—(for that is the real naturalist's business ; instead of confounding them with each other),—do you know distinctly the five great species of this familiar bird ?—the swallow, the house-martin, the sand-martin, the swift, and the Alpine swift ?—or can you so much as answer the first question which would suggest itself to any careful observer of the form of its most familiar species,—yet which I do not find proposed, far less answered, in any scientific book,—namely, why a swallow has a swallow-tail ?

It is true that the tail feathers in many birds appear to be entirely,—even cumbrously, decorative ; as in the peacock, and birds of paradise. But I am confident that it is not so in the swallow, and that the forked tail, so defined in form and strong in plume, has indeed important functions in guiding the flight ; yet notice how surrounded

one is on all sides with pitfalls for the theorists. The forked tail reminds you at once of a fish's; and yet, the action of the two creatures is wholly contrary. A fish lashes himself forward with his tail, and steers with his fins; a swallow lashes himself forward with his fins, and steers with his tail; partly, not necessarily, because in the most dashing of the swallows, the swift, the fork of the tail is the least developed. And I never watch the bird for a moment without finding myself in some fresh puzzle out of which there is no clue in the scientific books. I want to know, for instance, how the bird turns. What does it do with one wing, what with the other? Fancy the pace that has to be stopped; the force of bridle-hand put out in an instant. Fancy how the wings must bend with the strain; what need there must be for the perfect aid and work of every feather in them. There is a problem for you, students of mechanics,—How does a swallow turn?

You shall see, at all events, to begin with, to-day, how it gets along.

65. I say you shall see; but indeed you have often seen, and felt,—at least with your hands, if not with your shoulders,—when you chanced to be holding the sheet of a sail.

I have said that I never got into serapes by blaming people wrongly; but I often do by praising them wrongly. I never praised, without qualification, but one scientific book in my life (that I remember)—this of Dr. Petti-

grew's on the Wing; *—and now I must qualify my praise considerably, discovering, when I examined the book farther, that the good doctor had described the motion of a bird as resembling that of a kite, without ever inquiring what, in a bird, represented that somewhat important part of a kite, the string. You will, however, find the book full of important observations, and illustrated by valuable drawings. But the point in question you must settle for your-

* "On the Physiology of Wings." Transactions of the Royal Society of Edinburgh. Vol. xxvi., Part ii. I cannot sufficiently express either my wonder or regret at the petulance in which men of science are continually tempted into immature publicity, by their rivalry with each other. Page after page of this book, which, slowly digested and taken counsel upon, might have been a noble contribution to natural history, is occupied with dispute utterly useless to the reader, on the question of the priority of the author, by some months, to a French savant, in the statement of a principle which neither has yet proved; while page after page is rendered worse than useless to the reader by the author's passionate endeavour to contradict the ideas of unquestionably previous investigators. The problem of flight was, to all serious purpose, solved by Borelli in 1680, and the following passage is very notable as an example of the way in which the endeavour to obscure the light of former ages too fatally dims and distorts that by which modern men of science walk, themselves. "Borelli, and all who have written since his time, are unanimous in affirming that the horizontal transference of the body of the bird is due to the perpendicular vibration of the wings, and to the yielding of the posterior or flexible margins of the wings in an upward direction, as the wings descend. I" (Dr. Pettigrew) "am, however, disposed to attribute it to the fact (1st), that *the wings*, both when elevated and depressed, *leap forwards* in curves, those curves uniting to form a continuous waved track; (2nd), *to the tendency which the body of the bird has to swing forwards*, in a more or less horizontal direction, *when once set in motion*; (3rd), to the construction of the wings; they are elastic helices or screws, which twist and untwist while they vibrate, *and tend to bear upwards and onwards any weight suspended from them*; (4th), *to the reaction of the air on the under sur-*

selves, and you easily may. Some of you, perhaps, knew, in your time, better than the doctor, how a kite stopped; but I do not doubt that a great many of you also know, now, what is much more to the purpose, how a ship gets along. I will take the simplest, the most natural, the most beautiful of sails,—the lateen sail of the Mediterranean.

66. I draw it rudely in outline, as it would be set for a side-wind on the boat you probably know best,—the boat

faces of the wings; (5th), to the ever-varying power with which the wings are urged, this being greatest at the beginning of the down-stroke, and least at the end of the up one; (6th), to the contraction of the voluntary muscles and elastic ligaments, and to the effect produced by the various inclined surfaces formed by the wings during their oscillations; (7th), to the weight of the bird—weight itself, when acting upon wings, becoming a propelling power, and so contributing to horizontal motion."

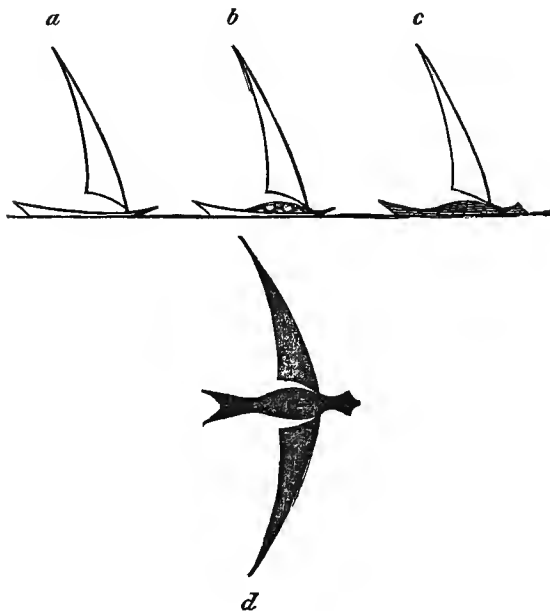
I will collect these seven reasons for the forward motion, in the gist of them, which I have marked by italics, that the reader may better judge of their collective value. The bird is carried forward, according to Dr. Pettigrew—

1. Because its wings leap forward.
2. Because its body has a tendency to swing forward.
3. Because the wings are screws so constructed as to screw upwards and onwards any body suspended from them.
4. Because the air reacts on the under surfaces of the wings.
5. Because the wings are urged with ever-varying power.
6. Because the voluntary muscles contract.
7. Because the bird is heavy.

What must be the general conditions of modern science, when it is possible for a man of great experimental knowledge and practical ingenuity, to publish nonsense such as this, becoming, to all intents and purposes, insane, in the passion of his endeavour to overthrow the statements of his rival? Had he merely taken patience to consult any elementary scholar in dynamics, he would have been enabled to understand his own machines, and develope, with credit to himself, what had been rightly judged or noticed by others.

of burden on the Lake of Geneva (Fig. 3), not confusing the drawing by adding the mast, which, you know, rakes a little, carrying the yard across it. (*a*). Then, with your permission, I will load my boat thus, with a few casks of

FIG. 3.



Vevay vintage—and, to keep them cool, we will put an awning over them, so (*b*). Next, as we are classical scholars, instead of this rustic stem of the boat, meant only to run easily on a flat shore, we will give it an Attie *εμβολον* (*c*). (We have no business, indeed, yet, to put an

εμβολον on a boat of burden, but I hope some day to see all our ships of war loaded with bread and wine, instead of artillery.) Then I shade the entire form (*c*); and, lastly, reflect it in the water (*d*)—and you have seen something like that before, besides a boat, haven't you?

There is the gist of the whole business for you, put in very small space; with these only differences: in a boat, the air strikes the sail; in a bird, the sail strikes the air: in a boat, the force is lateral, and in a bird downwards; and it has its sail on both sides. I shall leave you to follow out the mechanical problem for yourselves, as far as the mere resolution of force is concerned. My business, as a painter, is only with the exquisite organic weapon that deals with it.

67. Of which you are now to note farther, that a bird is required to manage his wing so as to obtain two results with one blow:—he has to keep himself up, as well as to get along.

But observe, he only requires to keep himself up *because* he has to get along. The buoyancy might have been given at once, if nature had wanted *that* only; she might have blown the feathers up with the hot air of the breath, till the bird rose in air like a cork in water. But it has to be, not a buoyant cork, but a buoyant *bullet*. And therefore that it may have momentum for pace, it must have weight to carry; and to carry that weight, the wings must deliver their blow with effective vertical, as well as oblique, force.

Here, again, you may take the matter in brief sum. Whatever is the ship's loss, is the bird's gain; whatever tendency the ship has to leeway, is all given to the bird's support, so that every atom* of force in the blow is of service.

68. Therefore you have to construct your organic weapon, so that this absolutely and perfectly economized force may be distributed as the bird chooses at any moment. That, if it wants to rise, it may be able to strike vertically more than obliquely;—if the order is, go a-head, that it may put the oblique screw on. If it wants to stop in an instant, that it may be able to throw its wings up full to the wind; if it wants to hover, that it may be able to lay itself quietly on the wind with its wings and tail, or, in calm air, to regulate their vibration and expansion into tranquillity of gliding, or of pausing power. Given the various proportions of weight and wing; the conditions of possible increase of muscular force and quill-strength in proportion to size; and the different objects and circumstances of flight,—you have a series of exquisitely complex problems, and exquisitely perfect solutions, which the life of the youngest among you cannot be long enough to read through so much as once, and of which the future infinitudes of human life, however granted or extended, never will be fatigued in admiration.

* I don't know what word to use for an infinitesimal degree or divided portion of force: one can't properly speak of a force being cut into pieces; but I can think of no other word than atom.

69. I take the rude outline of sail in Fig. 3, and now considering it as a jib of one of our own sailing vessels, slightly exaggerate the loops at the edge, and draw curved lines from them to the opposite point, Fig. 4; and

FIG. 4.



I have a reptilian or dragon's wing, which would, with some ramification of the supporting ribs, become a bat's or moth's; that is to say, an extension of membrane between the ribs (as in an umbrella), which will catch the wind, and flutter upon it, like a leaf; but cannot strike it to any purpose. The flying squirrel drifts like a falling leaf; the bat flits like a black rag torn at the edge. To give power, we must have plumes that can strike, as with the flat of a sword-blade; and to give *perfect* power, these must be laid over each other, so that each may support the one below it. I use the word below advisedly: we have to strike *down*. The lowest feather is the one that

first meets the adverse force. It is the one to be supported.

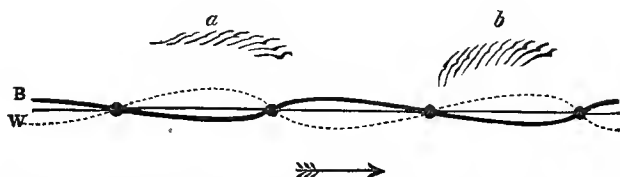
Now for the manner of the support. You must all know well the look of the machicolated parapets in mediæval castles. You know they are carried on rows of small projecting buttresses constructed so that, though the uppermost stone, far-projecting, would break easily under any shock, it is supported by the next below, and so on, down to the wall. Now in this figure I am obliged to separate the feathers by white spaces, to show you them distinctly. In reality they are set as close to each other as can be, but putting them as close as I can, you get *a* or *b*, Fig. 5, for the rough section of the wing, thick towards the bird's head, and curved like a sickle, so that in striking down it catches the air, like a reaping-hook, and in rising up, it throws off the air like a pent-house.

70. The stroke would therefore be vigorous, and the recovery almost effortless, were even the direction of both actually vertical. But they are vertical only with relation to the bird's body. In space they follow the forward flight, in a softly curved line; the downward stroke being as effective as the bird chooses, the recovery scarcely encounters resistance in the softly gliding ascent. Thus, in Fig. 5, (I can only explain this to readers a little versed in the elements of mechanics,) if *B* is the locus of the centre of gravity of the bird, moving in slow flight in the direction of the arrow, *w* is the locus of the leading feather of its wing, and *a* and *b*, roughly, the succes-

•

sive positions of the wing in the down-stroke and recovery.

FIG. 5.



71. I say the down-stroke is as effective as the bird chooses; that is to say, it can be given with exactly the quantity of impulse, and exactly the quantity of supporting power, required at the moment. Thus, when the bird wants to fly slowly, the wings are fluttered fast, giving vertical blows; if it wants to pause absolutely in still air, (this large birds cannot do, not being able to move their wings fast enough,) the velocity becomes vibration, as in the humming-bird: but if there is wind, any of the larger birds can lay themselves on it like a kite, their own weight answering the purpose of the string, while they keep the wings and tail in an inclined plane, giving them as much gliding ascent as counteracts the fall. They nearly all, however, use some slightly gliding force at the same time; a single stroke of the wing, with forward intent, seeming enough to enable them to glide on for half a minute or more without stirring a plume. A circling eagle floats an inconceivable time without visible stroke: (fancy the pretty action of the inner wing, *backing* air instead of water, which

gives exactly the breadth of circle he chooses). But for exhibition of the complete art of flight, a swallow on rough water is the master of masters. A seagull, with all its splendid power, generally has its work cut out for it, and is visibly fighting; but the swallow plays with wind and wave as a girl plays with her fan, and there are no words to say how many things it does with its wings in any ten seconds, and does consummately. The mystery of its dart remains always inexplicable to me; no eye can trace the bending of bow that sends that living arrow.

But the main structure of the noble weapon we may with little pains understand.

72. In the sections *a* and *b* of Fig. 5, I have only represented the quills of the outer part of the wing. The relation of these, and of the inner quills, to the bird's body may be very simply shown.

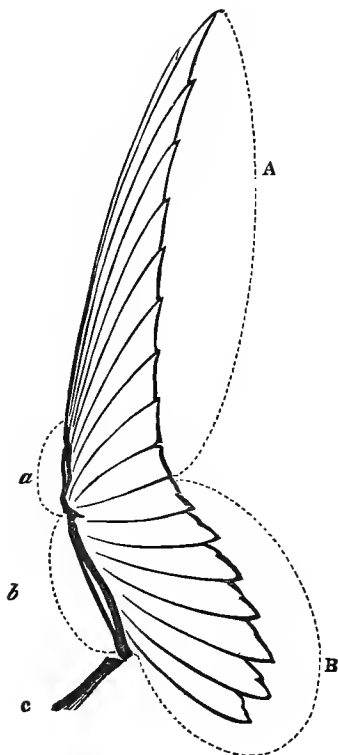
Fig. 6 is a rude sketch, typically representing the wing of any bird, but actually founded chiefly on the seagull's.

It is broadly composed of two fans, A and B. The outmost fan, A, is carried by the bird's hand; of which I rudely sketch the contour of the bones at *a*. The innermost fan, B, is carried by the bird's fore-arm, from wrist to elbow, *b*.

The strong humerus, *c*, corresponding to our arm from shoulder to elbow, has command of the whole instrument. No feathers are attached to this bone; but covering and protecting ones are set in the skin of it, completely filling,

when the active wing is open, the space between it and the body. But the plumes of the two great fans, A and B, are set into the bones; in Fig. 8, farther on, are

FIG. 6.



shown the projecting knobs on the main arm bone, set for the reception of the quills, which make it look like the

club of Hercules. The connection of the still more powerful quills of the outer fan with the bones of the hand is quite beyond all my poor anatomical perceptions, and, happily for me, also beyond needs of artistic investigation.

73. The feathers of the fan A are called the primaries. Those of the fan B, secondaries. Effective actions of flight, whether for support or forward motion, are, I believe, all executed with the primaries, every one of which may be briefly described as the strongest scymitar that can be made of quill substance; flexible within limits, and elastic at its edges—carried by an elastic central shaft—twisted like a windmill sail—striking with the flat, and recovering with the edge.

The secondary feathers are more rounded at the ends, and frequently notched; their curvature is reversed to that of the primaries; they are arranged, when expanded, somewhat in the shape of a shallow cup, with the hollow of it downwards, holding the air therefore, and aiding in all the pause and buoyancy of flight, but little in the activity of it. Essentially they are the brooding and covering feathers of the wing; exquisitely beautiful—as far as I have yet seen, *most* beautiful—in the bird whose brooding is of most use to us; and which has become the image of all tenderness. “How often would I have gathered thy children . . . and ye would not.”

74. Over these two chief masses of the plume are set others which partly complete their power, partly adorn

and protect them ; but of these I can take no notice at present. All that I want you to understand is the action of the two main masses, as the wing is opened and closed.

FIG. 7.

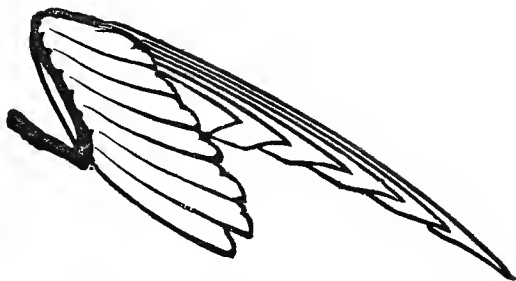


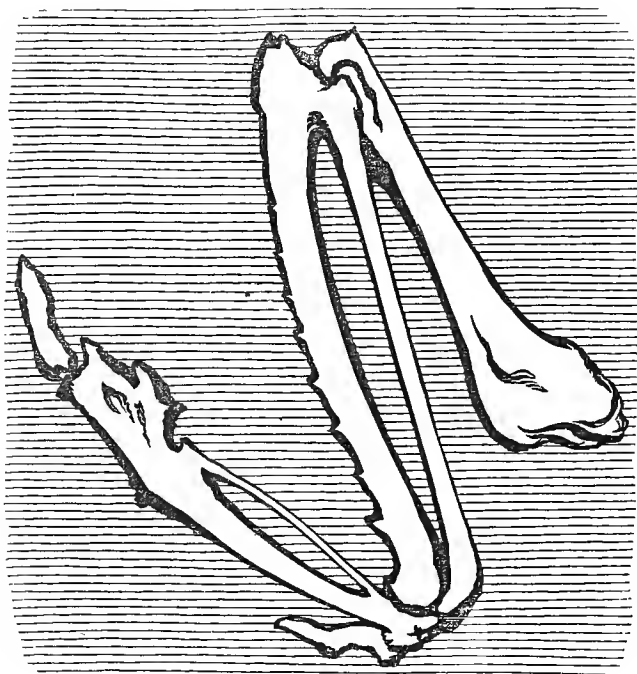
Fig. 7 roughly represents the upper surface of the main feathers of the wing closed. The secondaries are folded over the primaries ; and the primaries shut up close, with their outer edges parallel, or nearly so. Fig. 8 roughly shows the outline of the bones, in this position, of one of the larger pigeons.*

75. Then Fig. 9 is (always sketched in the roughest way) the outer, Fig. 10 the inner, surface of a seagull's wing in this position. Next, Fig. 11 shows the tops of the four lowest feathers in Fig. 9, in mere outline ; A separate (pulled off, so that they can be set side by side), B shut up close in the folded wing, C opened in the spread wing.

* I find even this mere outline of anatomical structure so interfere with the temper in which I wish my readers to think, that I shall withdraw it in my complete edition.

76. And now, if you will yourselves watch a few birds in flight, or opening and closing their wings to prune them, you will soon know as much as is needful for our

FIG. 8.



art purposes ; and, which is far more desirable, feel how very little we know, to any purpose, of even the familiar creatures that are our companions.

Even what we have seen to-day * is more than appears to have been noticed by the most careful painters of the great schools; and you will continually fancy that I am inconsistent with myself in pressing you to learn, better than they, the anatomy of birds, while I violently and constantly urge you to refuse the knowledge of the anatomy of men. But you will find, as my system develops itself, that it is absolutely consistent throughout. I don't

FIG. 9.



mean, by telling you not to study human anatomy, that you are not to know how many fingers and toes you have, nor how you can grasp and walk with them; and, simi-

* Large and somewhat carefully painted diagrams were shown at the lecture, which I cannot engrave but for my complete edition.

larly, when you look at a bird, I wish you to know how many claws and wing-feathers it has, and how it grips and flies with them. Of the bones, in either, I shall show you little ; and of the muscles, nothing but what can be seen in the living creature, nor, often, even so much.

77. And accordingly, when I now show you this sketch of my favourite Holbein, and tell you that it is entirely disgraceful he should not know what a wing was, better, —I don't mean that it is disgraceful he should not know the anatomy of it, but that he should never have looked at it to see how the feathers lie.

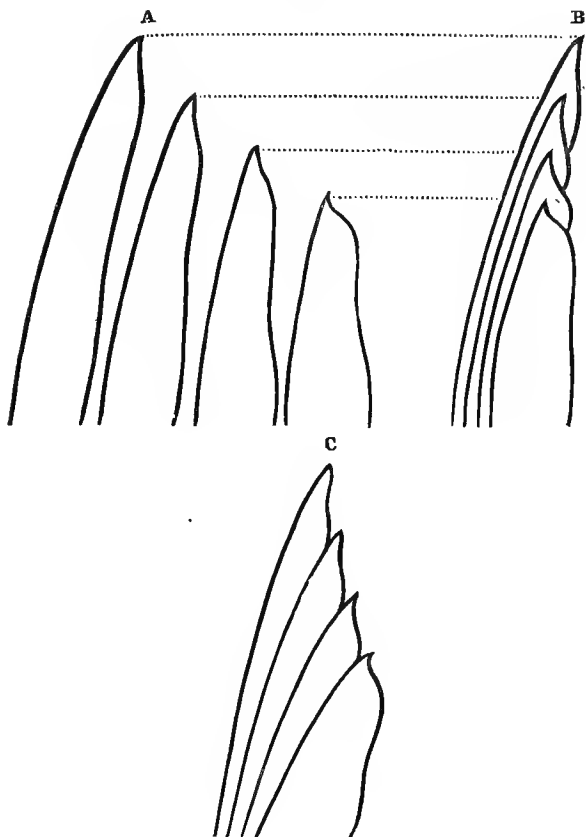
FIG. 10.



Now Holbein paints men gloriously, but never looks at birds ; Gibbons, the woodcutter, carves birds, but

can't men;—of the two faults the last is the worst; but

FIG. 11.



the right is in looking at the whole of nature in due comparison, and with universal candour and tenderness.

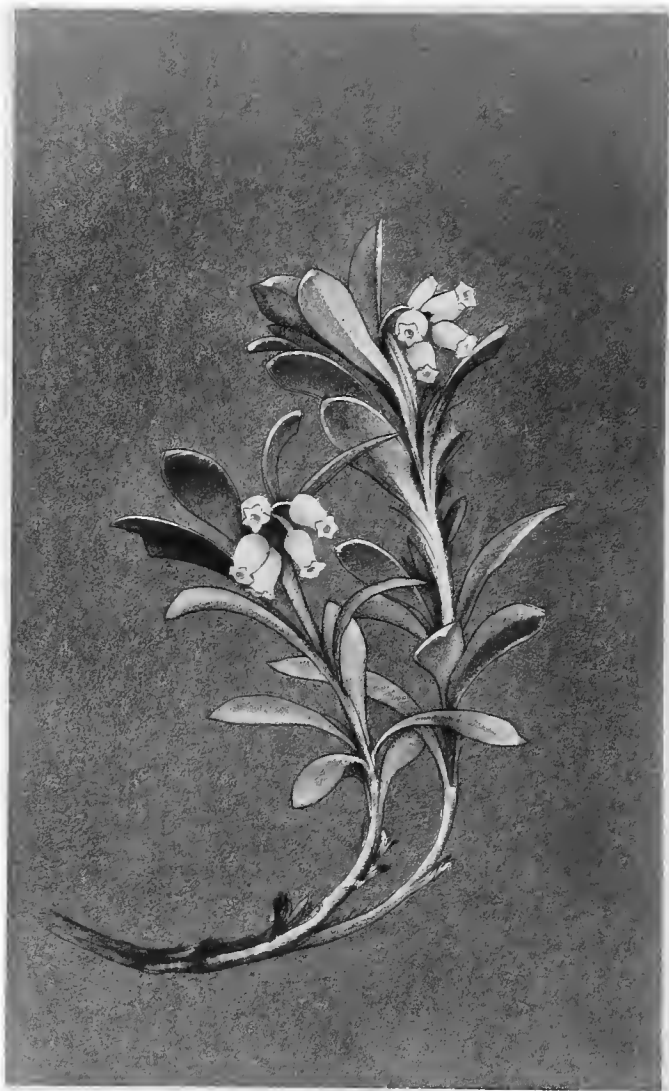
78. At the whole of nature, I say, not at *super-nature*—at what you suppose to be above the visible nature about you. If you are not inclined to look at the wings of birds, which God has given you to handle and to see, much less are you to contemplate, or draw imaginations of, the wings of angels, which you can't see. Know your own world first—not denying any other, but being quite sure that the place in which you are now put is the place with which you are now concerned; and that it will be wiser in you to think the gods themselves may appear in the form of a dove, or a swallow, than that, by false theft from the form of dove or swallow, you can represent the aspect of gods.

79. One sweet instance of such simple conception, in the end of the *Odyssey*, must surely recur to your minds in connection with our subject of to-day, but you may not have noticed the recurrent manner in which Homer insists on the thought. When Ulysses first bends and strings his bow, the vibration of the chord is shrill, “like the note of a swallow.” A poor and unwarlike simile, it seems! But in the next book, when Ulysses stands with his bow lifted, and Telemachus has brought the lances, and laid them at his feet, and Athena comes to his side to encourage him,—do you recollect the gist of her speech? “You fought,” she says, “nine years for the sake of Helen, and for another’s house:—now, returned, after all those wanderings, and under your own roof, for it, and its treasures, will you not fight, then?” And she herself

flies up to the house-roof, and thence, *in the form of the swallow*, guides the arrows of vengeance for the violation of the sanctities of home.

80. To-day, then, I believe verily for the first time, I have been able to put before you some means of guidance to understand the beauty of the bird which lives with you in your own houses, and which purifies for you, from its insect pestilence, the air that you breathe. Thus the sweet domestic thing has done, for men, at least these four thousand years. She has been their companion, not of the home merely, but of the hearth, and the threshold; companion only endeared by departure, and showing better her loving-kindness by her faithful return. Type sometimes of the stranger, she has softened us to hospitality; type always of the suppliant, she has enchanted us to mercy; and in her feeble presence, the cowardice, or the wrath, of sacrilege has changed into the fidelities of sanctuary. Herald of our summer, she glances through our days of gladness; numberer of our years, she would teach us to apply our hearts to wisdom;—and yet, so little have we regarded her, that this very day, scarcely able to gather from all I can find told of her enough to explain so much as the unfolding of her wings, I can tell you nothing of her life—nothing of her journeying: I cannot learn how she builds, nor how she chooses the place of her wandering, nor how she traces the path of her return. Remaining thus blind and careless to the true ministries of the humble creature whom God has really

sent to serve us, we in our pride, thinking ourselves surrounded by the pursuivants of the sky, can yet only invest them with majesty by giving them the calm of the bird's motion, and shade of the bird's plume:—and after all, it is well for us, if, when even for God's best mercies, and in His temples marble-built, we think that, “with angels and archangels, and all the company of Heaven, we laud and magnify His glorious name”—well for us, if our attempt be not only an insult, and His ears open rather to the inarticulate and unintended praise, of “the Swallow, twittering from her straw-built shed.”



Drawn by J. Ruskin.

Artotype, Harroun & Bierstadt N. Y.

VIII.

MYRTILLA REGINA.

Sketched for her gesture only. Isella. 1877

PROSERPINA.

STUDIES OF WAYSIDE FLOWERS,

WHILE THE AIR WAS YET PURE

*AMONG THE ALPS, AND IN THE SCOTLAND AND
ENGLAND WHICH MY FATHER KNEW.*

BY

JOHN RUSKIN, LL.D.,

HONORARY STUDENT OF CHRIST CHURCH, AND SLADE PROFESSOR OF FINE ART.

“Oh—Prosérpina !
For the flowers now, which frightened, thou let'st fall
From Dis's waggon.”

VOLUME I.

NEW YORK :
JOHN WILEY & SONS,
15 ASTOR PLACE.

1879.

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PROSERPINA.

INTRODUCTION.

BRANTWOOD, 14th *Murch*, 1874.

YESTERDAY evening I was looking over the first book in which I studied Botany,—Curtis's Magazine, published in 1795 at No. 3, St. George's Crescent, Blackfriars Road, and sold by the principal booksellers in Great Britain and Ireland. Its plates are excellent, so that I am always glad to find in it the picture of a flower I know. And I came yesterday upon what I suppose to be a variety of a favourite flower of mine, called, in Curtis, "the St. Bruno's Lily."

I am obliged to say "what I suppose to be a variety," because my pet lily is branched,* while this is drawn as unbranched, and especially stated to be so. And the page of text, in which this statement is made, is so characteristic of botanical books, and botanical science, not to say all science as hitherto taught for the blessing of mankind ;

* At least, it throws off its flowers on each side in a bewilderingly pretty way ; a real lily can't branch, I believe : but, if not, what is the use of the botanical books saying "on an unbranched stem" ?



and of the difficulties thereby accompanying its communication, that I extract the page entire, printing it, opposite, as nearly as possible in facsimile.

Now you observe, in this instructive page, that you have in the first place, nine names given you for one flower; and that among these nine names, you are not even at liberty to make your choice, because the united authority of Haller and Miller may be considered as an accurate balance to the single authority of Linnæus; and you ought therefore for the present to remain, yourself, balanced between the sides. You may be farther embarrassed by finding that the *Anthericum* of Savoy is only described as growing in Switzerland. And farther still, by finding that Mr. Miller describes two varieties of it, which differ only in size, while you are left to conjecture whether the one here figured is the larger or smaller; and how great the difference is.

Farther, If you wish to know anything of the habits of the plant, as well as its nine names, you are informed that it grows both at the bottoms of the mountains, and the tops; and that, with us, it flowers in May and June,—but you are not told when, in its native country.

The four lines of the last clause but one, may indeed be useful to gardeners; but—although I know my good father and mother did the best they could for me in buying this beautiful book; and though the admirable plates of it did their work, and taught me much, I cannot wonder that neither my infantine nor boyish mind was irresist-

ANTHERICUM LILIASTRUM. SAVOY ANTHEICUM,
or ST. BRUNO'S LILY.



Class and Order.

HEXANDRIA MONOGYNIA.

Generic Character.

Cor. 6-petala, patens. *Caps.* ovata.

Specific Character and Synonyms.

ANTHERICUM *Lilium* foliis planis, scapo simplicissimo, corollis campanulatis, staminibus declinatis. *Linn. Syst. Vegetab. ed. 14. Murr. p. 330. Ait. Kew. v. I. p. 449.*

HEMEROCALLIS floribus patulis secundis. *Hall. Hist. n. 1230.*

PHALANGIUM magno flore. *Bauh. Pin. 29.*

PHALANGIUM Allobrogicum majus. *Clus. cur. app. alt.*

PHALANGIUM Allobrogicum. The Savoye Spider-wort. *Park. Parad. p. 150. tab. 151. f. 1.*

Botanists are divided in their opinions respecting the genus of this plant; LINNÆUS considers it as an *Anthericum*, HALLER and MILLER make it an *Hemerocallis*.

It is a native of Switzerland, where, HALLER informs us it grows abundantly in the Alpine meadows, and even on the summits of the mountains; with us it flowers in May and June.

It is a plant of great elegance, producing on an unbranched stem about a foot and a half high, numerous flowers of a delicate white colour, much smaller but resembling in form those of the common white lily, possessing a considerable degree of fragrance, their beauty is heightened by the rich orange colour of their antheræ; unfortunately they are but of short duration.

MILLER describes two varieties of it differing merely in size.

A loamy soil, a situation moderately moist, with an eastern or western exposure, suits this plant best; so situated, it will increase by its roots, though not very fast, and by parting of these in the autumn, it is usually propagated.

PARKINSON describes and figures it in his *Parad. Terrest.*, observing that "divers allured by the beauty of its flowers, had brought it into these parts."

ibly attracted by the text of which this page is one of the most favourable specimens ; nor, in consequence, that my botanical studies were—when I had attained the age of fifty—no farther advanced than the reader will find them in the opening chapter of this book.

Which said book was therefore undertaken, to put, if it might be, some elements of the science of botany into a form more tenable by ordinary human and childish faculties ; or—for I can scarcely say I have yet any tenure of it myself—to make the paths of approach to it more pleasant. In fact, I only know, of it, the pleasant distant effects which it bears to simple eyes ; and some pretty mists and mysteries, which I invite my young readers to pierce, as they may, for themselves,—my power of guiding them being only for a little way.

Pretty mysteries, I say, as opposed to the vulgar and ugly mysteries of the so-called science of botany,—exemplified sufficiently in this chosen page. Respecting which, please observe farther ;—Nobody—I can say this very boldly—loves Latin more dearly than I ; but, precisely because I do love it (as well as for other reasons), I have always insisted that books, whether scientific or not, ought to be written either in Latin, or English ; and not in a doggish mixture of the refuse of both.

Linnæus wrote a noble book of universal Natural History in Latin. It is one of the permanent classical treasures of the world. And if any scientific man thinks his labors are worth the world's attention, let him, also, write

what he has to say in Latin, finishedly and exquisitely, if it take him a month to a page.*

But if—which, unless he be one chosen of millions, is assuredly the fact—his lucubrations are only of local and temporary consequence, let him write, as clearly as he can, in his native language.

This book, accordingly, I have written in English; (not, by the way, that I *could* have written it in anything else—so there are small thanks to me); and one of its purposes is to interpret, for young English readers, the necessary European Latin or Greek names of flowers, and to make them vivid and vital to their understandings. But two great difficulties occur in doing this. The first, that there are generally from three or four, up to two dozen, Latin names current for every flower; and every new botanist thinks his eminence only to be properly asserted by adding another.

The second, and a much more serious one, is of the Devil's own contriving—(and remember I am always quite serious when I speak of the Devil,)—namely, that the most current and authoritative names are apt to be founded on some unclean or debasing association, so that to interpret them is to defile the reader's mind. I will give no instance; too many will at once occur to any

* I have by happy chance just added to my Oxford library the poet Gray's copy of Linnæus, with its exquisitely written Latin notes, exemplary alike to scholar and naturalist.

learned reader, and the unlearned I need not vex with so much as one: but, in such cases, since I could only take refuge in the untranslated word by leaving other Greek or Latin words also untranslated, and the nomenclature still entirely senseless,—and I do not choose to do this,—there is only one other course open to me, namely, to substitute boldly, to my own pupils, other generic names for the plants thus faultfully hitherto titled.

As I do not do this for my own pride, but honestly for my reader's service, I neither question nor care how far the emendations I propose may be now or hereafter adopted. I shall not even name the cases in which they have been made for the serious reason above specified; but even shall mask those which there was real occasion to alter, by sometimes giving new names in cases where there was no necessity of such kind. Doubtless I shall be accused of doing myself what I violently blame in others. I do so; but with a different motive—of which let the reader judge as he is disposed. The practical result will be that the children who learn botany on the system adopted in this book will know the useful and beautiful names of plants hitherto given, in all languages; the useless and ugly ones they will not know. And they will have to learn one Latin name for each plant, which, when differing from the common one, I trust may yet by some scientific persons be accepted, and with ultimate advantage.

The learning of the one Latin name—as, for instance, *Gramen striatum*—I hope will be accurately enforced al-

ways;—but not less carefully the learning of the pretty English one—“Ladielace Grass”—with due observance that “Ladies’ laces hath leaves like unto Millet in fashion, with many white vaines or ribs, and silver strakes running along through the midst of the leaves, fashioning the same like to laces of white and green silk, very beautiful and faire to behold.”

I have said elsewhere, and can scarcely repeat too often, that a day will come when men of science will think their names disgraced, instead of honoured, by being used to barbarise nomenclature; I hope therefore that my own name may be kept well out of the way; but, having been privileged to found the School of Art in the University of Oxford, I think that I am justified in requesting any scientific writers who may look kindly upon this book, to add such of the names suggested in it as they think deserving of acceptance, to their own lists of synonyms, under the head of “Schol. Art. Oxon.”

The difficulties thrown in the way of any quiet private student by existing nomenclature may be best illustrated by my simply stating what happens to myself in endeavouring to use the page above facsimile’d. Not knowing how far St. Bruno’s Lily might be connected with my own pet one, and not having any sufficient book on Swiss botany, I take down Loudon’s Encyclopædia of Plants, (a most useful book, as far as any book in the present state of the science *can* be useful,) and find, under the head of *Anthericum*, the Savoy Lily indeed, but only the follow-

ing general information:—"809. Anthericum. A name applied by the Greeks to the stem of the asphodel, and not misapplied to this set of plants, which in some sort resemble the asphodel. Plants with fleshy leaves, and spikes of bright *yellow* flowers, easily cultivated if kept dry."

Hunting further, I find again my Savoy lily called a spider-plant, under the article *Hemerocallis*, and the only information which the book gives me under *Hemerocallis*, is that it means 'beautiful day' lily; and then, "This is an ornamental genus of the easiest culture. The species are remarkable among border flowers for their fine *orange*, *yellow*, or *blue* flowers. The *Hemerocallis cœrulea* has been considered a distinct genus by Mr. Salisbury, and called *Saussurea*." As I correct this sheet for press, however, I find that the *Hemerocallis* is now to be called 'Funkia,' "in honour of Mr. Funk, a Prussian apothecary."

All this while, meantime, I have a suspicion that my pet Savoy Lily is not, in existing classification, an *Anthericum*, nor a *Hemerocallis*, but a *Lilium*. It is, in fact, simply a Turk's cap which doesn't curl up. But on trying 'Lilium' in Loudon, I find no mention whatever of any wild branched white lily.

I then try the next word in my specimen page of Curtis; but there is no 'Phalangium' at all in Loudon's index. And now I have neither time nor mind for more search, but will give, in due place, such account as I can

of my own dwarf branched lily, which I shall call St. Bruno's, as well as this *Liliastrum*—no offence to the saint, I hope. For it grows very gloriously on the limestones of Savoy, presumably, therefore, at the Grande Chartreuse; though I did not notice it there, and made a very unmonkish use of it when I gathered it last:—There was a pretty young English lady at the table-d'hôte, in the Hotel du Mont Blanc at St. Martin's,* and I wanted to get speech of her, and didn't know how. So all I could think of was to go half-way up the Aiguille de Varens, to gather St. Bruno's lilies; and I made a great cluster of them, and put wild roses all around them as I came down. I never saw anything so lovely; and I thought to present this to her before dinner,—but when I got down, she had gone away to Chamouni. My Fors always treated me like that, in affairs of the heart.

I had begun my studies of Alpine botany just eighteen years before, in 1842, by making a careful drawing of wood-sorrel at Chamouni; and bitterly sorry I am, now, that the work was interrupted. For I drew, then, very delicately; and should have made a pretty book if I could have got peace. Even yet, I can manage my point a little, and would far rather be making outlines of flowers, than writing; and I meant to have drawn every English and Scottish wild flower, like this cluster of bog heather opposite,†—back, and profile, and front. But 'Blackwood's

* It was in the year 1860, in June.

† Admirably engraved by Mr. Burgess, from my pen drawing, now at
1*

Magazine,' with its insults to Turner, dragged me into controversy ; and I have not had, properly speaking, a day's peace since ; so that in 1868 my botanical studies were advanced only as far as the reader will see in next chapter ; and now, in 1874, must end altogether, I suppose, heavier thoughts and work coming fast on me. So that, finding among my notebooks, two or three, full of broken materials for the proposed work on flowers ; and, thinking they may be useful even as fragments, I am going to publish them in their present state,—only let the reader note that while my other books endeavour, and claim, so far as they reach, to give trustworthy knowledge of their subjects, this one only shows how such knowledge may be obtained ; and it is little more than a history of efforts and plans,—but of both, I believe, made in right methods.

One part of the book, however, will, I think, be found of permanent value. Mr. Burgess has engraved on wood, in reduced size, with consummate skill, some of the excellent old drawings in the *Flora Danica*, and has interpreted, and facsimile'd, some of his own and my drawings from nature, with a vigour and precision unsurpassed in woodcut illustration, which render these outlines the best exercises in black and white I have yet been able to pre-

Oxford. By comparing it with the plate of the same flower in Sowerby's work, the student will at once see the difference between attentive drawing, which gives the cadence and relation of masses in a group, and the mere copying of each flower in an unconsidered huddle.

pare for my drawing pupils. The larger engravings by Mr. Allen may also be used with advantage as copies for drawings with pen or sepia.

ROME, 10th May (*my father's birthday*).

I found the loveliest blue asphodel I ever saw in my life, yesterday, in the fields beyond Monte Mario,—a spire two feet high, of more than two hundred stars, the stalks of them all deep blue, as well as the flowers. Heaven send all honest people the gathering of the like, in Elysian fields, some day !

CHAPTER I.

MOSS.

DENMARK HILL, 3rd November, 1868.

1. It is mortifying enough to write,—but I think thus much ought to be written,—concerning myself, as ‘the author of *Modern Painters*.’ In three months I shall be fifty years old: and I don’t at this hour—ten o’clock in the morning of the two hundred and sixty-eighth day of my forty-ninth year—know what ‘moss’ is.

There is nothing I have more *intended* to know—some day or other. But the moss ‘would always be there’; and then it was so beautiful, and so difficult to examine, that one could only do it in some quite separated time of happy leisure—which came not. I never was like to have less leisure than now, but I *will* know what moss is, if possible, forthwith.

2. To that end I read preparatorily, yesterday, what account I could find of it in all the botanical books in the house. Out of them all, I get this general notion of a moss,—that it has a fine fibrous root,—a stem surrounded with spirally set leaves,—and produces its fruit in a small case, under a cap. I fasten especially, however, on a sen-

tence of Louis Figuier's, about the particular species, *Hypnum* :—

“These mosses, which often form little islets of verdure at the feet of poplars and willows, are robust vegetable organisms, which do not decay.” *

3. “*Qui ne pourrissent point.*” What do they do with themselves, then ?—it immediately occurs to me to ask. And, secondly,—If this immortality belongs to the *Hypnum* only ?

It certainly does not, by any means : but, however modified or limited, this immortality is the first thing we ought to take note of in the mosses. They are, in some degree, what the “everlasting” is in flowers. Those minute green leaves of theirs do not decay, nor fall.

But how do they die, or how stop growing, then ?—it is the first thing I want to know about them. And from all the books in the house, I can't as yet find out this. Meanwhile I will look at the leaves themselves.

4. Going out to the garden, I bring in a bit of old brick, emerald green on its rugged surface,† and a thick piece of mossy turf.

First, for the old brick : To think of the quantity of pleasure one has had in one's life from that emerald green velvet,—and yet that for the first time to-day I am verily going to look at it ! Doing so, through a pocket

* “*Histoire des Plantes.*” Ed. 1865, p. 416.

† The like of it I have now painted, Number 281, CASE XII., in the Educational Series of Oxford.

lens of no great power, I find the velvet to be composed of small star-like groups of smooth, strong, oval leaves,—intensely green, and much like the young leaves of any other plant, except in this;—they all have a long brown spike, like a sting, at their ends.

5. Fastening on that, I take the *Flora Danica*,* and look through its plates of mosses, for their leaves only; and I find, first, that this spike, or strong central rib, is characteristic;—secondly, that the said leaves are apt to be not only spiked, but serrated, and otherwise angry-looking at the points;—thirdly, that they have a tendency to fold together in the centre (Fig. 1†); and at last, after an



FIG. 1.

hour's work at them, it strikes me suddenly that they are more like pineapple leaves than anything else.

And it occurs to me, very unpleasantly, at the same time, that I don't know what a pineapple is!

Stopping to ascertain that, I am told that a pineapple belongs to the 'Bromeliaceæ'—(can't stop to find out what that means)—nay, that of these plants "the pineapple is the representative" (Loudon); "their habit is acid, their leaves rigid, and toothed with spines, their

* Properly, *Floræ Danicæ*, but it is so tiresome to print the diphthongs that I shall always call it thus. It is a folio series, exquisitely begun, a hundred years ago; and not yet finished.

† Magnified about seven times. See note at end of this chapter.

bracteas often coloured with scarlet, and their flowers either white or blue"—(what are their flowers like?) But the two sentences that most interest me, are, that in the damp forests of Carolina, the *Tillandsia*, which is an 'epiphyte' (*i.e.*, a plant growing on other plants,) "forms dense festoons among the branches of the trees, vegetating among the black mould that collects upon the bark of trees in hot damp countries; other species are inhabitants of deep and gloomy forests, and others form, with their spring leaves, an impenetrable herbage in the Pampas of Brazil." So they really seem to be a kind of moss, on a vast scale.

6. Next, I find in Gray,* *Bromeliaceæ*, and—the very thing I want—"Tillandsia, the black moss, or long moss, which, *like most Bromelias*, grows on the branches of trees." So the pineapple is really a moss; only it is a moss that flowers but 'imperfectly.' "The fine fruit is caused by the consolidation of the imperfect flowers." (I wish we could consolidate some imperfect English moss-flowers into little pineapples then,—though they were only as big as filberts.) But we cannot follow that farther now; nor consider when a flower is perfect, and when it is not, or we should get into morals, and I don't know where else; we will go back to the moss I have gathered, for I begin to see my way, a little, to understanding it.

* American,—*'System of Botany,'* the best technical book I have.

7. The second piece I have on the table is a cluster—an inch or two deep—of the moss that grows everywhere, and that the birds use for nest-building, and we for packing, and the like. It is dry, since yesterday, and its fibres define themselves against the dark ground in warm green, touched with a glittering light. Note that burnished lustre of the minute leaves; they are necessarily always relieved against dark hollows, and this lustre makes them much clearer and brighter than if they were of dead green. In that lustre—and it is characteristic of them—they differ wholly from the dead, aloe-like texture of the pineapple leaf; and remind me, as I look at them closely, a little of some conditions of chaff, as on heads of wheat after being threshed. I will hunt down that clue presently; meantime there is something else to be noticed on the old brick.

8. Out of its emerald green cushions of minute leaves, there rise, here and there, thin red threads, each with a little brown cap, or something like a cap, at the top of it. These red threads shooting up out of the green tufts, are, I believe, the fructification of the moss; fringing its surface in the woods, and on the rocks, with the small forests of brown stems, each carrying its pointed cap or crest—of infinitely varied ‘mode,’ as we shall see presently; and, which is one of their most blessed functions, carrying high the dew in the morning; every spear balancing its own crystal globe.

9. And now, with my own broken memories of moss,

and this unbroken, though unfinished, gift of the noble labour of other people, the *Flora Danica*, I can generalize the idea of the precious little plant, for myself, and for the reader.

All mosses, I believe, (with such exceptions and collateral groups as we may afterwards discover, but they are not many,) that is to say, some thousands of species, are, in their strength of existence, composed of fibres surrounded by clusters of dry *spinous* leaves, set close to the fibre they grow on. Out of this leafy stem descends a fibrous root, and ascends in its season, a capped seed.

We must get this very clearly into our heads. Fig. 2, A, is a little tuft of a common wood moss of Norway,* in its fruit season, of its real size; but at present I want to look at the central fibre and its leaves accurately, and understand that first.

10. Pulling it to pieces, we find it composed of seven little company-keeping fibres, each of which, by itself, appears as in Fig. 2, B: but as in this, its real size, it

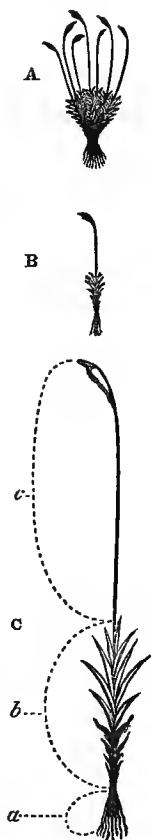


FIG. 2.

* '*Dicranum cerviculatum*,' sequel to *Flora Danica*, Tab. MMCCX.

is too small, not indeed for our respect, but for our comprehension, we magnify it, Fig. 2, c, and thereupon perceive it to be indeed composed of, *a*, the small fibrous root which sustains the plant; *b*, the leaf-surrounded stem which is the actual being, and main creature, moss; and, *c*, the aspirant pillar, and cap, of its fructification.

11. But there is one minor division yet. You see I have drawn the central part of the moss plant (*b*, Fig. 2,) half in outline and half in black; and that, similarly, in the upper group, which is too small to show the real roots, the base of the cluster is black. And you remember, I doubt not, how often in gathering what most invited gathering, of deep green, starry, perfectly soft and living wood-moss, you found it fall asunder in your hand into multitudes of separate threads, each with its bright green crest, and long root of blackness.

That blackness at the root—though only so notable in this wood-moss and collateral species, is indeed a general character of the mosses, with rare exceptions. It is their funeral blackness;—that, I perceive, is the way the moss leaves die. They do not fall—they do not visibly decay. But they decay *invisibly*, in continual secession, beneath the ascending crest. They rise to form that crest, all green and bright, and take the light and air from those out of which they grew;—and those, their ancestors, darken and die slowly, and at last become a mass of mouldering ground. In fact, as I perceive farther, their final duty is so to die. The main work of other leaves is

in their life,—but these have to form the earth out of which all other leaves are to grow. Not to cover the rocks with golden velvet only, but to fill their crannies with the dark earth, through which nobler creatures shall one day seek their being.

12. “Grant but as many sorts of mind as moss.” Pope could not have known the hundredth part of the number of ‘sorts’ of moss there are; and I suppose he only chose the word because it was a monosyllable beginning with m, and the best English general expression for despised and minute structures of plants. But a fate rules the words of wise men, which makes their words truer, and worth more, than the men themselves know. No other plants have so endless variety on so similar a structure as the mosses; and none teach so well the humility of Death. As for the death of our bodies, we have learned, wisely, or unwisely, to look the fact of that in the face. But none of us, I think, yet care to look the fact of the death of our minds in the face. I do not mean death of our souls, but of our mental work. So far as it is good *art*, indeed, and done in realistic form, it may perhaps not die; but so far as it was only good *thought*—good, for its time, and apparently a great achievement therein—that good, useful thought may yet in the future become a foolish thought, and then die quite away,—it, and the memory of it,—when better thought and knowledge come. But the better thought could not have come if the weaker thought had not come first, and died in sustaining the

better. If we think honestly, our thoughts will not only live usefully, but even perish usefully—like the moss—and become dark, not without due service. But if we think dishonestly, or malignantly, our thoughts will die like evil fungi,—dripping corrupt dew.

13. But farther. If you have walked moorlands enough to know the look of them, you know well those flat spaces or causeways of bright green or golden ground between the heathy rock masses; which signify winding pools and inlets of stagnant water caught among the rocks;—pools which the deep moss that covers them—*blanched*, not black, at the root,—is slowly filling and making firm; whence generally the unsafe ground in the moorland gets known by being *mossy* instead of heathy; and is at last called by its riders, briefly, ‘the Moss’: and as it is mainly at these same mossy places that the riding is difficult, and brings out the gifts of horse and rider, and discomfits all followers not similarly gifted, the skilled crosser of them got his name, naturally, of ‘moss-rider,’ or moss-trooper. In which manner the moss of Norway and Scotland has been a taskmaster and Maker of Soldiers, as yet, the strongest known among natural powers. The lightning may kill a man, or cast down a tower, but these little tender leaves of moss—they and their progenitors—have trained the Northern Armies.

14. So much for the human meaning of that decay of the leaves. Now to go back to the little creatures themselves. It seems that the upper part of the moss fibre is

especially *undecaying* among leaves; and the lower part, especially decaying. That, in fact, a plant of moss-fibre is a kind of persistent state of what is, in other plants, annual. Watch the year's growth of any luxuriant flower. First it comes out of the ground all fresh and bright; then, as the higher leaves and branches shoot up, those first leaves near the ground get brown, sickly, earthy,—remain for ever degraded in the dust, and under the dashed slime in rain, staining, and grieving, and loading them with obloquy of envious earth, half-killing them,—only life enough left in them to hold on the stem, and to be guardians of the rest of the plant from all they suffer;—while, above them, the happier leaves, for whom they are thus oppressed, bend freely to the sunshine, and drink the rain pure.

The moss strengthens on a diminished scale, intensifies, and makes perpetual, these two states,—bright leaves above that never wither, leaves beneath that exist only to wither.

15. I have hitherto spoken only of the fading moss as it is needed for change into earth. But I am not sure whether a yet more important office, in its days of age, be not its use as a colour.

We are all thankful enough—as far as we ever are so—for green moss, and yellow moss. But we are never enough grateful for black moss. The golden would be nothing without it, nor even the grey.

It is true that there are black lichens enough, and

brown ones: nevertheless, the chief use of lichens is for silver and gold colour on rocks; and it is the dead moss which gives the leopard-like touches of black. And yet here again—as to a thing I have been looking at and painting all my life—I am brought to pause, the moment I think of it carefully. The black moss which gives the precious Velasquez touches, lies, much of it, flat on the rocks; radiating from its centres—powdering in the fingers, if one breaks it off, like dry tea. Is it a black species? or a black-parched state of other species, perishing for the sake of Velasquez effects, instead of accumulation of earth? and, if so, does it die of drought, accidentally, or, in a sere old age, naturally? and how is it related to the rich green bosses that grow in deep velvet? And there again is another matter not clear to me. One calls them ‘velvet’ because they are all brought to an even surface at the top. Our own velvet is reduced to such trimness by cutting. But how is the moss trimmed? By what scissors? Carefullest Elizabethan gardener never shaped his yew hedge more daintily than the moss fairies smooth these soft rounded surfaces of green and gold. And just fancy the difference, if they were ragged! If the fibres had every one of them leave to grow at their own sweet will, and to be long or short as they liked, or, worse still, urged by fairy prizes into laboriously and agonizingly trying which could grow longest. Fancy the surface of a spot of competitive moss!

16. But how is it that they are subdued into that spheri-

cal obedience, like a crystal of wavellite? * Strange—that the vegetable creatures growing so fondly on rocks should form themselves in that mineral-like manner. It is true that the tops of all well-grown trees are rounded, on a large scale, as equally ; but that is because they grow from a central stem, while these mossy mounds are made out of independent filaments, each growing to exactly his proper height in the sphere—short ones outside, long in the middle. Stop, though ; *is* that so ? I am not even sure of that ; perhaps they are built over a little dome of decayed moss below. † I must find out how every fila-

* The reader should buy a small specimen of this mineral ; it is a useful type of many structures.

† LUCCA, *Aug. 9th*, 1874.—I have left this passage as originally written, but I believe the dome is of accumulated earth. Bringing home, here, evening after evening, heaps of all kinds of mosses from the hills among which the Archbishop Ruggieri was bunting the wolf and her whelps in Ugolino's dream, I am more and more struck, every day, with their special function as earth-gatherers, and with the enormous importance to their own brightness, and to our service, of that dark and degraded state of the inferior leaves. And it fastens itself in my mind mainly as their distinctive character, that as the leaves of a tree become wood, so the leaves of a moss become earth, while yet a normal part of the plant. Here is a cake in my hand weighing half a pound, bright green on the surface, with minute crisp leaves ; but an inch thick beneath in what looks at first like clay, but is indeed knitted fibre of exhausted moss. Also, I don't at all find the generalization I made from the botanical books likely to have occurred to me from the real things. No moss leaves that I can find here give me the idea of resemblance to pineapple leaves ; nor do I see any, through my weak lens, clearly ser-

ment grows, separately—from root to cap, through the spirally set leaves. And meanwhile I don't know very clearly so much as what a root is—or what a leaf is. Before puzzling myself any farther in examination either of moss or any other grander vegetable, I had better define these primal forms of all vegetation, as well as I can—or rather begin the definition of them, for future completion and correction. For, as my reader must already sufficiently perceive, this book is literally to be one of studies—not of statements. Some one said of me once, very shrewdly, When he wants to work out a subject, he writes a book on it. That is a very true saying in the main,—I work down or up to my mark, and let the reader see process and progress, not caring to conceal them. But this book will be nothing but process. I don't mean to assert anything positively in it from the first page to the last. Whatever I say, is to be understood only as a conditional statement—liable to, and inviting, correction. And this the more because, as on the whole, I am at war with the botanists, I can't ask them to help me, and then

rated; but I do find a general tendency to run into a silky filamentous structure, and in some, especially on a small one gathered from the fissures in the marble of the cathedral, white threads of considerable length at the extremities of the leaves, of which threads I remember no drawing or notice in the botanical books. Figure 1 represents, magnified, a cluster of these leaves, with the germinating stalk springing from their centre; but my scrawl was tired and careless, and for once, Mr. Burgess has copied *too* accurately.

call them names afterwards. I hope only for a contemptuous heaping of coals on my head by correction of my errors from them;—in some cases, my scientific friends will, I know, give me forgiving aid;—but, for many reasons, I am forced first to print the imperfect statement, as I can independently shape it; for if once I asked for, or received help, every thought would be frost-bitten into timid expression, and every sentence broken by apology. I should have to write a dozen of letters before I could print a line, and the line, at last, would be only like a bit of any other botanical book—trustworthy, it might be, perhaps; but certainly unreadable. Whereas now, it will rather put things more forcibly in the reader's mind to have them retouched and corrected as we go on; and our natural and honest mistakes will often be suggestive of things we could not have discovered but by wandering.

On these guarded conditions, then, I proceed to study, with my reader, the first general laws of vegetable form.

CHAPTER II.

THE ROOT.

1. PLANTS in their perfect form consist of four principal parts,—the Root, Stem, Leaf, and Flower. It is true that the stem and flower are parts, or remnants, or altered states, of the leaves ; and that, speaking with close accuracy, we might say, a perfect plant consists of leaf and root. But the division into these four parts is best for practical purposes, and it will be desirable to note a few general facts about each, before endeavouring to describe any one kind of plant. Only, because the character of the stem depends on the nature of the leaf and flower, we must put it last in order of examination ; and trace the development of the plant first in root and leaf ; then in the flower and its fruit ; and lastly in the stem.

2. First, then, the Root.

Every plant is divided, as I just said, in the main, into two parts, and these have opposite natures. One part seeks the light ; the other hates it. One part feeds on the air ; the other on the dust.

The part that loves the light is called the Leaf. It is an old Saxon word ; I cannot get at its origin. The part that hates the light is called the Root.

In Greek, *ρίζα*, Rhiza.*

In Latin, Radix, "the growing thing," which shortens, in French, into Race, and then they put on the diminutive 'ine,' and get their two words, Race, and Racine, of which we keep Race for animals, and use for vegetables a word of our own Saxon (and Dutch) dialect,—'root'; (connected with Rood—an image of wood; whence at last the Holy Rood, or Tree).

3. The Root has three great functions :

1st. To hold the plant in its place.

2nd. To nourish it with earth.

3rd. To receive vital power for it from the earth.

With this last office is in some degree,—and especially in certain plants,—connected, that of reproduction.

But in all plants the root has these three essential functions.

First, I said, to hold the Plant in its place. The Root is its Fetter.

You think it, perhaps, a matter of course that a plant is not to be a crawling thing? It is not a matter of course at all. A vegetable might be just what it is now, as compared with an animal;—might live on earth and water instead of on meat,—might be as senseless in life, as calm in death, and in all its parts and apparent structure un-

* Learn this word, at any rate; and if you know any Greek, learn also this group of words: "*ὡς ρίζα ἐν γῇ δειψωση*," which you may chance to meet with, and even to think about, some day.

changed ; and yet be a crawling thing. It is quite as easy to conceive plants moving about like lizards, putting forward first one root and then another, as it is to think of them fastened to their place. It might have been well for them, one would have thought, to have the power of going down to the streams to drink, in time of drought ;—of migrating in winter with grim march from north to south of Dunsinane Hill side. But that is not their appointed Fate. They are—at least all the noblest of them, rooted to their spot. Their honour and use is in giving immoveable shelter,—in remaining landmarks, or lovemarks, when all else is changed :

“The cedars wave on Lebanon,
But Judah’s statelier maids are gone.”

4. Its root is thus a form of fate to the tree. It condemns, or indulges it, in its place. These semi-living creatures, come what may, shall abide, happy, or tormented. No doubt concerning “the position in which Providence has placed *them*,” is to trouble their minds, except so far as they can mend it by seeking light, or shrinking from wind, or grasping at support, within certain limits. In the thoughts of men they have thus become twofold images,—on the one side, of spirits restrained and half destroyed, whence the fables of transformation into trees ; on the other, of spirits patient and continuing, having root in themselves and in good ground, capable of all persistent

effort and vital stability, both in themselves, and for the human States they form.

5. In this function of holding fast, roots have a power of grasp quite different from that of branches. It is not a grasp, or clutch by contraction, as that of a bird's claw, or of the small branches we call 'tendrils' in climbing plants. It is a dead, clumsy, but inevitable grasp, by swelling, *after* contortion. For there is this main difference between a branch and root, that a branch cannot grow vividly but in certain directions and relations to its neighbour branches ; but a root can grow wherever there is earth, and can turn in any direction to avoid an obstacle.*

6. In thus contriving access for itself where it chooses, a root contorts itself into more serpent-like writhing than branches can ; and when it has once coiled partly round a rock, or stone, it grasps it tight, necessarily, merely by swelling. Now a root has force enough sometimes to split rocks, but not to crush them ; so it is compelled to grasp by *flattening* as it thickens ; and, as it must have room somewhere, it alters its own shape as if it were made of

* "Duhamel, botanist of the last century, tells us that, wishing to preserve a field of good land from the roots of an avenue of elms which were exhausting it, he cut a ditch between the field and avenue to intercept the roots. But he saw with surprise those of the roots which had not been cut, go down behind the slope of the ditch to keep out of the light, go under the ditch, and into the field again." And the Swiss naturalist Bonnet said wittily, apropos of a wonder of this sort, "that sometimes it was difficult to distinguish a cat from a rosehush."

dough, and holds the rock, not in a claw, but in a wooden cast or mould, adhering to its surface. And thus it not only finds its anchorage in the rock, but binds the rocks of its anchorage with a constrictor cable.

7. Hence—and this is a most important secondary function—roots bind together the ragged edges of rocks as a hem does the torn edge of a dress: they literally stitch the stones together; so that, while it is always dangerous to pass under a treeless edge of overhanging crag, as soon as it has become beautiful with trees, it is safe also. The rending power of roots on rocks has been greatly overrated. Capillary attraction in a willow wand will indeed split granite, and swelling roots sometimes heave considerable masses aside, but on the whole, roots, small and great, bind, and do not rend.* The surfaces of mountains are dissolved and disordered, by rain, and frost, and chemical decomposition, into mere heaps of loose stones on their desolate summits; but, where the forests grow, soil accumulates and disintegration ceases. And by cutting down forests on great mountain slopes, not only is the climate destroyed, but the danger of superficial landslip fearfully increased.

8. The second function of roots is to gather for the plant the nourishment it needs from the ground. This is

* As the first great office of the mosses is the gathering of earth, so that of the grasses is the binding of it. Theirs the Enchanter's toil, not in vain,—making ropes out of sea-sand.

partly water, mixed with some kinds of air (ammonia, etc.,) but the plant can get both water and ammonia from the atmosphere ; and, I believe, for the most part does so ; though, when it cannot get water from the air, it will gladly drink by its roots. But the things it cannot receive from the air at all are certain ^{ex}earthly salts, essential to it (as iron is essential in our own blood), and of which when it has quite exhausted the earth, no more such plants can grow in that ground. On this subject you will find enough in any modern treatise on agriculture ; all that I want you to note here is that this feeding function of the root is of a very delicate and discriminating kind, needing much searching and mining among the dust, to find what it wants. If it only wanted water, it could get most of that by spreading in mere soft senseless limbs, like sponge, as far, and as far down, as it could—but to get the *salt* out of the earth it has to *sift* all the earth, and taste and touch every grain of it that it can, with fine fibres. And therefore a root is not at all a merely passive sponge or absorbing thing, but an infinitely subtle tongue, or tasting and eating thing. That is why it is always so fibrous and divided and entangled in the clinging earth.

9. “Always fibrous and divided” ? But many roots are quite hard and solid !

No ; the active part of the root is always, I believe, a fibre. But there is often a provident and passive part—a savings bank of root—in which nourishment is laid up for the plant, and which, though it may be underground, is no

more to be considered its real root than the kernel of a seed is. When you sow a pea, if you take it up in a day or two, you will find the fibre below, which is root; the shoot above, which is plant; and the pea as a now partly exhausted storehouse, looking very woful, and like the granaries of Paris after the fire. So, the round solid root of a cyclamen, or the conical one which you know so well as a carrot, are not properly roots, but permanent storehouses,—only the fibres that grow from them are roots. Then there are other apparent roots which are not even storehouses, but refuges; houses where the little plant lives in its infancy, through winter and rough weather. So that it will be best for you at once to limit your idea of a root to this,—that it is a group of growing fibres which taste and suck what is good for the plant out of the ground, and by their united strength hold it in its place; only remember the thick limbs of roots do not feed, but only the fine fibres at the ends of them which are something between tongues and sponges, and while they absorb moisture readily, are yet as particular about getting what they think nice to eat as any dainty little boy or girl; looking for it everywhere, and turning angry and sulky if they don't get it.

10. But the root has, it seems to me, one more function, the most important of all. I say, it seems to me, for observe, what I have hitherto told you is all (I believe) ascertained and admitted; this that I am going to tell you has not yet, as far as I know, been asserted by men of

science, though I believe it to be demonstrable. But you are to examine into it, and think of it for yourself.

There are some plants which appear to derive all their food from the air—which need nothing but a slight grasp of the ground to fix them in their place. Yet if we were to tie them into that place, in a framework, and cut them from their roots, they would die. Not only in these, but in all other plants, the vital power by which they shape and feed themselves, whatever that power may be, depends; I think, on that slight touch of the earth, and strange inheritance of its power. It is as essential to the plant's life as the connection of the head of an animal with its body by the spine is to the animal. Divide the feeble nervous thread, and all life ceases. Nay, in the tree the root is even of greater importance. You will not kill the tree, as you would an animal, by dividing its body or trunk. The part not severed from the root will shoot again. But in the root, and its touch of the ground, is the life of it. My own definition of a plant would be "a living creature whose source of vital energy is in the earth" (or in the water, as a form of the earth; that is, in inorganic substance). There is, however, one tribe of plants which seems nearly excepted from this law. It is a very strange one, having long been noted for the resemblance of its flowers to different insects; and it has recently been proved by Mr. Darwin to be dependent on insects for its existence. Doubly strange therefore, it seems, that in some cases this race of plants all but reaches the independent life of

insects. It rather *settles* upon boughs than roots itself in them ; half of its roots may wave in the air.

11. What vital power is, men of science are not a step nearer knowing than they were four thousand years ago. They are, if anything, farther from knowing now than then, in that they imagine themselves nearer. But they know more about its limitations and manifestations than they did. They have even arrived at something like a proof that there is a fixed quantity of it flowing out of things and into them. But, for the present, rest content with the general and sure knowledge that, fixed or flowing, measurable or immeasurable—one with electricity or heat or light, or quite distinct from any of them—life is a delightful, and its negative, death, a dreadful thing, to human creatures ; and that you can give or gather a certain quantity of life into plants, animals, and yourself by wisdom and courage, and by their reverses can bring upon them any quantity of death you please, which is a much more serious point for you to consider than what life and death are.

12. Now, having got a quite clear idea of a root properly so called, we may observe what those storehouses, refuges, and ruins are, which we find connected with roots. The greater number of plants feed and grow at the same time ; but there are some of them which like to feed first and grow afterwards. For the first year, or, at all events, the first period of their life, they gather material for their future life out of the ground and out

of the air, and lay it up in a storehouse as bees make combs. Of these stores—for the most part rounded masses tapering downwards into the ground—some are as good for human beings as honeycombs are; only not so sweet. We steal them from the plants, as we do from the bees, and these conical upside-down hives or treasuries of Atreus, under the names of carrots, turnips, and radishes, have had important influence on human fortunes. If we do not steal the store, next year the plant lives upon it, raises its stem, flowers and seeds out of that abundance, and having fulfilled its destiny, and provided for its successor, passes away, root and branch together.

13. There is a pretty example of patience for us in this; and it would be well for young people generally to set themselves to grow in a carrotty or turnippy manner, and lay up secret store, not caring to exhibit it until the time comes for fruitful display. But they must not, in after-life, imitate the spendthrift vegetable, and blossom only in the strength of what they learned long ago; else they soon come to contemptible end. Wise people live like laurels and cedars, and go on mining in the earth, while they adorn and embalm the air.

14. Secondly, Refuges. As flowers growing on trees have to live for some time, when they are young in their buds, so some flowers growing on the ground have to live for a while, when they are young, *in* what we call their

roots. These are mostly among the *Drosidæ** and other humble tribes, loving the ground; and, in their babyhood, liking to live quite down in it. A baby crocus has literally its own little dome—domus, or duomo—within which in early spring it lives a delicate convent life of its own, quite free from all worldly care and dangers, exceedingly ignorant of things in general, but itself brightly golden and perfectly formed before it is brought out. These subterranean palaces and vaulted cloisters, which we call bulbs, are no more roots than the blade of grass is a root, in which the ear of corn forms before it shoots up.

15. Thirdly, Ruins. The flowers which have these subterranean homes form one of many families whose roots, as well as seeds, have the power of reproduction. The succession of some plants is trusted much to their seeds: a thistle sows itself by its down, an oak by its acorns; the companies of flying emigrants settle where they may; and the shadowy tree is content to cast down its showers of nuts for swines' food with the chance that here and there one may become a ship's bulwark. But others among plants are less careless, or less proud. Many are anxious for their children to grow in the place where they grew themselves, and secure this not merely by letting their fruit fall at their feet, on the chance of its growing up be-

* *Drosidæ*, in our school nomenclature, is the general name, including the four great tribes, iris, asphodel, amaryllis, and lily. See reason for this name given in the 'Queen of the Air,' Section II.

side them, but by closer bond, bud springing forth from root, and the young plant being animated by the gradually surrendered life of its parent. Sometimes the young root is formed above the old one, as in the crocus, or beside it, as in the amaryllis, or beside it in a spiral succession, as in the orchis; in these cases the old root always perishes wholly when the young one is formed; but in a far greater number of tribes, one root connects itself with another by a short piece of intermediate stem; and this stem does not at once perish when the new root is formed, but grows on at one end indefinitely, perishing slowly at the other, the scars or ruins of the past plants being long traceable on its sides. When it grows entirely underground it is called a root-stock. But there is no essential distinction between a root-stock and a creeping stem, only the root-stock may be thought of as a stem which shares the melancholy humour of a root in loving darkness, while yet it has enough consciousness of better things to grow towards, or near, the light. In one family it is even fragrant where the flower is not, and a simple houseleek is called '*rhodiola rosea*,' because its root-stock has the scent of a rose.

16. There is one very unusual condition of the root-stock which has become of much importance in economy, though it is of little in botany; the forming, namely, of knots at the ends of the branches of the underground stem, where the new roots are to be thrown out. Of these knots, or '*tubers*,' (swollen things,) one kind, belonging to

the tobacco tribe, has been singularly harmful, together with its pungent relative, to a neighbouring country of ours, which perhaps may reach a higher destiny than any of its friends can conceive for it, if it can ever succeed in living without either the potato, or the pipe.

17. Being prepared now to find among plants many things which are like roots, yet are not; you may simplify and make fast your true idea of a root as a fibre or group of fibres, which fixes, animates, and partly feeds the leaf. Then practically, as you examine plants in detail, ask first respecting them: What kind of root have they? Is it large or small in proportion to their bulk, and why is it so? What soil does it like, and what properties does it acquire from it? The endeavour to answer these questions will soon lead you to a rational inquiry into the plant's history. You will first ascertain what rock or earth it delights in, and what climate and circumstances; then you will see how its root is fitted to sustain it mechanically under given pressures and violences, and to find for it the necessary sustenance under given difficulties of famine or drought. Lastly you will consider what chemical actions appear to be going on in the root, or its store; what processes there are, and elements, which give pungency to the radish, flavour to the onion, or sweetness to the liquorice; and of what service each root may be made capable under cultivation, and by proper subsequent treatment, either to animals or men.

18. I shall not attempt to do any of this for you; I as-

sume, in giving this advice, that you wish to pursue the science of botany as your chief study ; I have only broken moments for it, snatched from my chief occupations, and I have done nothing myself of all this I tell you to do. But so far as you can work in this manner, even if you only ascertain the history of one plant, so that you know that accurately, you will have helped to lay the foundation of a true science of botany, from which the mass of useless nomenclature,* now mistaken for science, will fall away, as the husk of a poppy falls from the bursting flower.

* The only use of a great part of our existing nomenclature is to enable one botanist to describe to another a plant which the other has not seen. When the science becomes approximately perfect, all known plants will be properly figured, so that nobody need describe them ; and unknown plants be so rare that nobody will care to learn a new and difficult language, in order to be able to give an account of what in all probability he will never see.

CHAPTER III.

THE LEAF.

1. IN the first of the poems of which the English Government has appointed a portion to be sung every day for the instruction and pleasure of the people, there occurs this curious statement respecting any person who will behave himself rightly: "He shall be like a tree planted by the river side, that bears its fruit in its season. His leaf also shall not wither; and you will see that whatever he does will prosper."

I call it a curious statement, because the conduct to which this prosperity is promised is not that which the English, as a nation, at present think conducive to prosperity: but whether the statement be true or not, it will be easy for you to recollect the two eastern figures under which the happiness of the man is represented,—that he is like a tree bearing fruit "in its season;" (not so hastily as that the frost pinch it, nor so late that no sun ripens it;) and that "his leaf shall not fade." I should like you to recollect this phrase in the Vulgate—"folium ejus non defluet"—shall not fall *away*,—that is to say, shall not fall so as to leave any visible bareness in winter time, but

only that others may come up in its place, and the tree be always green.

2. Now, you know, the fruit of the tree is either for the continuance of its race, or for the good, or harm, of other creatures. In no case is it a good to the tree itself. It is not indeed, properly, a part of the tree at all, any more than the egg is part of the bird, or the young of any creature part of the creature itself. But in the leaf is the strength of the tree itself. Nay, rightly speaking, the leaves *are* the tree itself. Its trunk sustains; its fruit burdens and exhausts; but in the leaf it breathes and lives. And thus also, in the eastern symbolism, the fruit is the labour of men for others; but the leaf is their own life. "He shall bring forth fruit, in his time; and his own joy and strength shall be continual."

3. Notice next the word 'folium.' In Greek, *φυλλον*, 'phyllon.'

"The thing that is born," or "put forth." "When the branch is tender, and putteth forth her leaves, ye know that summer is nigh." The botanists say, "The leaf is an expansion of the bark of the stem." More accurately, the bark is a contraction of the tissue of the leaf. For every leaf is born out of the earth, and breathes out of the air; and there are many leaves that have no stems, but only roots. It is 'the springing thing'; this thin film of life; rising, with its *edge* out of the ground—infinately feeble, infinitely fair. With *Folium*, in Latin, is rightly associated the word *Flos*; for the flower is only a group of

singularly happy leaves. From these two roots come foglio, feuille, feuillage, and fleur ;—blume, blossom, and bloom ; our foliage, and the borrowed foil, and the connected technical groups of words in architecture and the sciences.

4. This *thin* film, I said. That is the essential character of a leaf ; to be thin,—widely spread out in proportion to its mass. It is the opening of the substance of the earth to the air, which is the giver of life. The Greeks called it, therefore, not only the born or blooming thing, but the spread or expanded thing—“*πεταλον*.” Pindar calls the beginnings of quarrel, “petals of quarrel.” Recollect, therefore, this form, Petalos ; and connect it with Petasos, the expanded cap of Mercury. For one great use of both is to give shade. The root of all these words is said to be *PIET* (Pet), which may easily be remembered in Greek, as it sometimes occurs in no unpleasant sense in English.

5. But the word ‘petalos’ is connected in Greek with another word, meaning, to fly,—so that you may think of a bird as spreading its petals to the wind ; and with another, signifying Fate in its pursuing flight, the overtaking thing, or overflying Fate. Finally, there is another Greek word meaning ‘wide,’ *πλατυς* (platys) ; whence at last our ‘plate’—a thing made broad or extended—but especially made broad or ‘flat’ out of the solid, as in a lump of clay extended on the wheel, or a lump of metal extended by the hammer. So the first we call Platter ; the second Plate, when of the precious metals. Then putting *b* for

p , and d for t , we get the blade of an oar, and blade of grass.

6. Now gather a branch of laurel, and look at it carefully. You may read the history of the being of half the earth in one of those green oval leaves—the things that the sun and the rivers have made out of dry ground. Daphne—daughter of Enipeus, and beloved by the Sun,—that fable gives you at once the two great facts about vegetation. Where warmth is, and moisture—there, also, the leaf. Where no warmth—there is no leaf; where there is no dew—no leaf.

7. Look, then, to the branch you hold in your hand. That you *can* so hold it, or make a crown of it, if you choose, is the first thing I want you to note of it;—the proportion of size, namely, between the leaf and *you*. Great part of your life and character, as a human creature, has depended on that. Suppose all leaves had been spacious, like some palm leaves; solid, like cactus stem; or that trees had grown, as they might of course just as easily have grown, like mushrooms, all one great cluster of leaf round one stalk. I do not say that they are divided into small leaves only for your delight, or your service, as if you were the monarch of everything—even in this atom of a globe. You are made of your proper size; and the leaves of theirs: for reasons, and by laws, of which neither the leaves nor you know anything. Only note the harmony between both, and the joy we may have in this division and mystery of the frivolous and tremulous petals,

which break the light and the breeze,—compared to what, with the frivolous and tremulous mind which is in us, we could have had out of domes, or penthouses, or walls of leaf.

8. Secondly ; think awhile of its dark clear green, and the good of it to you. Scientifically, you know green in leaves is owing to ‘chlorophyll,’ or, in English, to ‘green-leaf.’ It may be very fine to know that ; but my advice to you, on the whole, is to rest content with the general fact that leaves are green when they do not grow in or near smoky towns ; and not by any means to rest content with the fact that very soon there will not be a green leaf in England, but only greenish-black ones. ‘And thereon resolve that you will yourself endeavour to promote the growing of the green wood, rather than of the black.

9. Looking at the back of your laurel-leaves, you see how the central rib or spine of each, and the lateral branchings, strengthen and carry it. I find much confused use, in botanical works, of the words Vein and Rib. For, indeed, there are veins *in* the ribs of leaves, as marrow in bones ; and the projecting bars often gradually depress themselves into a transparent net of rivers. But the *mechanical* force of the framework in carrying the leaf-tissue is the point first to be noticed ; it is that which admits, regulates, or restrains the visible motions of the leaf ; while the system of circulation can only be studied through the microscope. But the ribbed leaf bears itself to the wind, as the webbed foot of a bird does to the

water, and needs the same kind, though not the same strength, of support; and its ribs always are partly therefore constituted of strong woody substance, which is knit out of the tissue; and you can extricate this skeleton framework, and keep it, after the leaf-tissue is dissolved. So I shall henceforward speak simply of the leaf and its ribs,—only specifying the additional veined structure on necessary occasions.

10. I have just said that the ribs—and might have said, farther, the stalk that sustains them—are knit out of the *tissue* of the leaf. But what is the leaf tissue itself knit out of? One would think that was nearly the first thing to be discovered, or at least to be thought of, concerning plants,—namely, how and of what they are made. We say they ‘grow.’ But you know that they can’t grow out of nothing;—this solid wood and rich tracery must be made out of some previously existing substance. What is the substance?—and how is it woven into leaves,—twisted into wood?

11. Consider how fast this is done, in spring. You walk in February over a slippery field, where, through hoar-frost and mud, you perhaps hardly see the small green blades of trampled turf. In twelve weeks you wade through the same field up to your knees in fresh grass; and in a week or two more, you mow two or three solid haystacks off it. In winter you walk by your currant-bush, or your vine. They are shrivelled sticks—like bits of black tea in the canister. You pass again in May, and

the currant-bush looks like a young sycamore tree ; and the vine is a bower : and meanwhile the forests, all over this side of the round world, have grown their foot or two in height, with new leaves—so much deeper, so much denser than they were. Where has it all come from ? Cut off the fresh shoots from a single branch of any tree in May. Weigh them ; and then consider that so much weight has been added to every such living branch, everywhere, this side the equator, within the last two months. What is all that made of ?

12. Well, this much the botanists really know, and tell us,—It is made chiefly of the breath of animals : that is to say, of the substance which, during the past year, animals have breathed into the air ; and which, if they went on breathing, and their breath were not made into trees, would poison them, or rather suffocate them, as people are suffocated in uncleansed pits, and dogs in the Grotta del Cane. So that you may look upon the grass and forests of the earth as a kind of green hoar-frost, frozen upon it from our breath, as, on the window-panes, the white arborescence of ice.

13. But how is it made into wood ?

The substances that have been breathed into the air are charcoal, with oxygen and hydrogen,—or, more plainly, charcoal and water. Some necessary earths,—in smaller quantity, but absolutely essential,—the trees get from the ground ; but, I believe all the charcoal they want, and most of the water, from the air. Now the question is, where and how do they take it in, and digest it into wood ?

14. You know, in spring, and partly through all the year, except in frost, a liquid called 'sap' circulates in trees, of which the nature, one should have thought, might have been ascertained by mankind in the six thousand years they have been cutting wood. Under the impression always that it *had been* ascertained, and that I could at any time know all about it, I have put off till to-day, 19th October, 1869, when I am past fifty, the knowing anything about it at all. But I will really endeavour now to ascertain something, and take to my botanical books, accordingly, in due order.

(1) Dresser's "Rudiments of Botany." 'Sap' not in the index; only Samara, and Sarcocarp,—about neither of which I feel the smallest curiosity. (2) Figuier's "Histoire des Plantes." * 'Sève,' not in index; only Serpolet, and Sherardia arvensis, which also have no help in them for me. (3) Balfour's "Manual of Botany." 'Sap,'—yes, at last. "Article 257. Course of fluids in exogenous stems." I don't care about the course just now: I want to know where the fluids come from. "If a plant be plunged into a weak solution of acetate of lead,"—I don't in the least want to know what happens. "From the minuteness of the tissue, it is not easy to determine the vessels through which the sap moves." Who said it was? If it had been easy, I should have done it myself. "Changes take place in the composition of the

* An excellent book, nevertheless.

sap in its upward course." I dare say ; but I don't know yet what its composition is before it begins going up. "The Elaborated Sap by Mr. Schultz has been called 'latex.'" I wish Mr. Schultz were in a hog's head of it, with the top on. "On account of these movements in the latex, the laticiferous vessels have been denominated cinchymatous." I do not venture to print the expressions which I here mentally make use of.

15. Stay,—here, at last, in Article 264, is something to the purpose: "It appears then that, in the case of Exogenous plants, the fluid matter in the soil, containing different substances in solution, is sucked up by the extremities of the roots." Yes, but how of the pine trees on yonder rock?—Is there any sap in the rock, or water either? The moisture must be seized during actual rain on the root, or stored up from the snow ; stored up, any way, in a tranquil, not actively sappy, state, till the time comes for its change, of which there is no account here.

16. I have only one chance left now. Lindley's "Introduction to Botany." 'Sap,'—yes,—'General motion of.' II. 325. "The course which is taken by the sap, after entering a plant, is the first subject for consideration." My dear doctor, I have learned nearly whatever I know of plant structure from you, and am grateful ; and that it is little, is not your fault, but mine. But this—let me say it with all sincere respect—is not what you should have told me here. You know, far better than I, that 'sap' never does enter a plant at all ; but only salt, or earth and water,

and that the roots alone could not make it; and that, therefore, the course of it must be, in great part, the result or process of the actual making. But I will read now, patiently; for I know you will tell me much that is worth hearing, though not perhaps what I want.

Yes; now that I have read Lindley's statement carefully, I find it is full of precious things; and this is what, with thinking over it, I can gather for you.

17. First, towards the end of January,—as the light enlarges, and the trees revive from their rest,—there is a general liquefaction of the blood of St. Januarius in their stems; and I suppose there is really a great deal of moisture rapidly absorbed from the earth in most cases; and that this absorption is a great help to the sun in drying the winter's damp out of it for us: then, with that strange vital power,—which scientific people are usually as afraid of naming as common people are afraid of naming Death,—the tree gives the gathered earth and water a changed existence; and to this new-born liquid an upward motion from the earth, as our blood has from the heart; for the life of the tree is out of the earth; and this upward motion has a mechanical power in pushing on the growth. “*Forced onward* by the current of sap, the plumule ascends,” (Lindley, p. 132,)—this blood of the tree having to supply, exactly as our own blood has, not only the forming powers of substance, but a continual evaporation, “approximately seventeen times more than that of the human body,” while the force of motion in the sap “is

sometimes five times greater than that which impels the blood in the crural artery of the horse."

18. Hence generally, I think we may conclude thus much,—that at every pore of its surface, under ground and above, the plant in the spring absorbs moisture, which instantly disperses itself through its whole system "by means of some permeable quality of the membranes of the cellular tissue invisible to our eyes even by the most powerful glasses" (p. 326); that in this way subjected to the vital power of the tree, it becomes sap, properly so called, which passes downwards through this cellular tissue, slowly and secretly; and then upwards, through the great vessels of the tree, violently, stretching out the supple twigs of it as you see a flaccid waterpipe swell and move when the cock is turned to fill it. And the tree becomes literally a fountain, of which the springing streamlets are clothed with new-woven garments of green tissue, and of which the silver spray stays in the sky,—a spray, now, of leaves.

19. That is the gist of the matter; and a very wonderful gist it is, to my mind. The secret and subtle descent—the violent and exulting resilience of the tree's blood,—what guides it?—what compels? The creature has no heart to beat like ours; one cannot take refuge from the mystery in a 'muscular contraction.' Fountain without supply—playing by its own force, for ever rising and falling all through the days of Spring, spending itself at last in gathered clouds of leaves, and iris of blossom.

Very wonderful; and it seems, for the present, that

we know nothing whatever about its causes;—nay, the strangeness of the reversed arterial and vein motion, without a heart, does not seem to strike anybody. Perhaps, however, it may interest you, as I observe it does the botanists, to know that the cellular tissue through which the motion is effected is called Parenchym, and the woody tissue, Bothrenchym; and that Parenchym is divided, by a system of nomenclature which “has some advantages over that more commonly in use,”* into merenchyma, conenchyma, ovenchyma, atractenchyma, cylindrenchyma, colpenchyma, cladenchyma, and prismenchyma.

20. Take your laurel branch into your hand again. There are, as you must well know, innumerable shapes and orders of leaves;—there are some like claws; some like fingers, and some like feet; there are endlessly cleft ones, and endlessly clustered ones, and inscrutable divisions within divisions of the fretted verdure; and wrinkles, and ripples, and stitchings, and hemmings, and pinchings, and gatherings, and crumplings, and clippings, and what not. But there is nothing so constantly noble as the pure leaf of the laurel, bay, orange, and olive; numerable, sequent, perfect in setting, divinely simple and serene. I shall call these noble leaves ‘Apolline’ leaves. They characterize many orders of plants, great and small,—from the magnolia to the myrtle, and exquisite ‘myrtille’

* Lindley, ‘Introduction to Botany,’ vol. i., p. 21. The terms “wholly obsolete,” says an authoritative botanic friend. Thank Heaven!

of the hills, (bilberry); but wherever you find them, strong, lustrous, dark green, simply formed, richly scented or stored,—you have nearly always kindly and lovely vegetation, in healthy ground and air.

21. The gradual diminution in rank beneath the Apolline leaf, takes place in others by the loss of one or more of the qualities above named. The Apolline leaf, I said, is strong, lustrous, full in its green, rich in substance, simple in form. The inferior leaves are those which have lost strength, and become thin, like paper; which have lost lustre, and become dead by roughness of surface, like the nettle,—(an Apolline leaf may become dead by *bloom*, like the olive, yet not lose beauty); which have lost colour and become feeble in green, as in the poplar, or *crudely* bright, like rice; which have lost substance and softness, and have nothing to give in scent or nourishment; or become flinty or spiny; finally, which have lost simplicity, and become cloven or jagged. Many of these losses are partly atoned for by gain of some peculiar loveliness. Grass and moss, and parsley and fern, have each their own delightfulness; yet they are all of inferior power and honour, compared to the Apolline leaves.

22. You see, however, that though your laurel leaf has a central stem, and traces of ribs branching from it, in a vertebrated manner, they are so faint that we cannot take it for a type of vertebrate structure. But the two figures of elm and alisma leaf, given in *Modern Painters* (vol. iii.), and now here repeated, Fig. 3, will clearly enough

show the opposition between this vertebrate form, branching again usually at the edges, *a*, and the softly opening lines diffused at the stem, and gathered at the point of the leaf *b*, which, as you almost without doubt know already

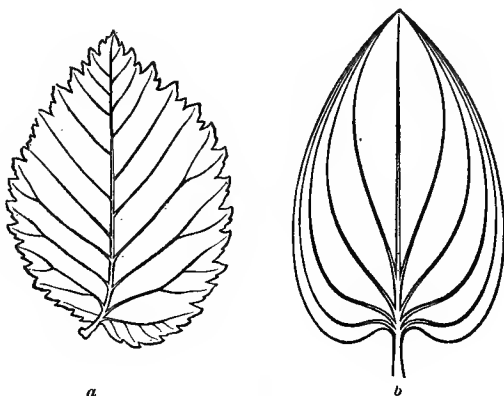


FIG 3.

are characteristic of a vast group of plants, including especially all the lilies, grasses, and palms, which for the most part are the signs of local or temporary moisture in hot countries ;—local, as of fountains and streams ; temporary, as of rain or inundation.

But temporary, still more definitely in the day, than in the year. When you go out, delighted, into the dew of the morning, have you ever considered why it is so rich upon the grass ;—why it is *not* upon the trees ? It *is* partly on the trees, but yet your memory of it will be always chiefly of its gleam upon the lawn. On many

trees you will find there is none at all. I cannot follow out here the many inquiries connected with this subject, but, broadly, remember the branched trees are fed chiefly by rain,—the unbranched ones by dew, visible or invisible; that is to say, at all events by moisture which they can gather for themselves out of the air; or else by streams and springs. Hence the division of the verse of the 'song of Moses: "My doctrine shall drop as the rain; my speech shall distil as the dew: as the *small* rain upon the tender *herb*, and as the showers upon the grass."

23. Next, examining the direction of the veins in the leaf of the alisma, *b*, Fig. 3, you see they all open widely, as soon as they can, towards the thick part of the leaf; and then taper, apparently with reluctance, pushing each other outwards, to the point. If the leaf were a lake of the same shape, and its stem the entering river, the lines of the currents passing through it would, I believe, be nearly the same as that of the veins in the aquatic leaf. I have not examined the fluid law accurately, and I do not suppose there is more real correspondence than may be caused by the leaf's expanding in every permitted direction, as the water would, with all the speed it can; but the resemblance is so close as to enable you to fasten the relation of the unbranched leaves to streams more distinctly in your mind,—just as the toss of the palm leaves from their stem may, I think, in their likeness to the springing of a fountain, remind you of their relation to the desert, and their necessity, therein, to life of man and beast.

24. And thus, associating these grass and lily leaves always with fountains, or with dew, I think we may get a pretty general name for them also. You know that Cora, our Madonna of the flowers, was lost in Sicilian Fields: you know, also, that the fairest of Greek fountains, lost in Greece, was thought to rise in a Sicilian islet; and that the real springing of the noble fountain in that rock was one of the causes which determined the position of the greatest Greek city of Sicily. So I think, as we call the fairest branched leaves 'Apolline,' we will call the fairest flowing ones 'Arethusan.' But remember that the Apolline leaf represents only the central type of land leaves, and is, within certain limits, of a fixed form; while the beautiful Arethusan leaves, alike in flowing of their lines, change their forms indefinitely,—some shaped like round pools, and some like winding currents, and many like arrows, and many like hearts, and otherwise varied and variable, as leaves ought to be,—that rise out of the waters, and float amidst the pausing of their foam.

25. Brantwood, *Easter Day*, 1875.—I don't like to spoil my pretty sentence, above; but on reading it over, I suspect I wrote it confusing the water-lily leaf, and other floating ones of the same kind, with the Arethusan forms. But the water-lily and water-ranunculus leaves, and such others, are to the orders of earth-loving leaves what ducks and swans are to birds; (the swan is the water-lily of birds;) they are *swimming* leaves; not properly watery creatures, or able to live under water like fish, (unless

when dormant), but just like birds that pass their lives on the surface of the waves—though they must breathe in the air.

And these natant leaves, as they lie on the water surface, do not want strong ribs to carry them,* but have very delicate ones beautifully branching into the orbed space, to keep the tissue nice and flat; while, on the other hand, leaves that really have to grow under water, sacrifice their tissue, and keep only their ribs, like coral animals; (*Ranunculus heterophyllus*, 'other-leaved Frog-flower,' and its like,) just as, if you keep your own hands too long in water, they shrivel at the finger-ends.

26. So that you must not attach any great botanical importance to the characters of contrasted aspects in leaves, which I wish you to express by the words 'Apolline' and 'Arethusan'; but their mythic importance is very great, and your careful observance of it will help you completely to understand the beautiful Greek fable of Apollo and Daphne. There are indeed several Daphnes, and the first root of the name is far away in another field of thought altogether, connected with the Gods of Light. But etymology, the best of servants, is an unreasonable master; and Professor Max Müller trusts his deep-reaching knowledge of the first ideas connected with the names of Athena

* "You should see the girders on under-side of the Victoria Water-lily, the most wonderful bit of engineering, of the kind, I know of."—('Botanical friend.')

and Daphne, too implicitly, when he supposes this idea to be retained in central Greek theology. 'Athena' originally meant only the dawn, among nations who knew nothing of a Sacred Spirit. But the Athena who catches Achilles by the hair, and urges the spear of Diomed, has not, in the mind of Homer, the slightest remaining connection with the mere beauty of daybreak. Daphne chased by Apollo, may perhaps—though I doubt even this much of consistence in the earlier myth—have meant the Dawn pursued by the Sun. But there is no trace whatever of this first idea left in the fable of Arcadia and Thessaly.

27. The central Greek Daphne is the daughter of one of the great *river* gods of Arcadia; her mother is the Earth. Now Arcadia is the Oberland of Greece; and the crests of Cyllene, Erymanthus, and Mænalus * surround it, like the Swiss forest cantons, with walls of rock, and shadows of pine. And it divides itself, like the Oberland, into three regions: first, the region of rock and snow, sacred to Mercury and Apollo, in which Mercury's birth on Cyllene, his construction of the lyre, and his stealing the oxen of Apollo, are all expressions of the enchantments of cloud and sound, mingling with the sunshine, on the cliffs of Cyllene.

“ While the mists
Flying, and rainy vapours, call out shapes

* Roughly, Cyllene 7,700 feet high; Erymanthus 7,000; Mænalus 6,000.

And phantoms from the crags and solid earth
 As fast as a musician scatters sounds
 Out of his instrument."

Then came the pine region, sacred especially to Pan and Mænalus, the son of Lycaon and brother of Callisto; and you had better remember this relationship carefully, for the sake of the meaning of the constellations of Ursa Major and the Mons Mænalius, and of their wolf and bear traditions; (compare also the strong impression on the Greek mind of the wild leafiness, nourished by snow, of the Bœotian Cithæron,—“Oh, thou lake-hollow, full of divine leaves, and of wild creatures, nurse of the snow, darling of Diana,” (Phœnissæ, 801). How wild the climate of this pine region is, you may judge from the pieces in the note below * out of Colonel Leake’s diary in cross-

* *March 3rd.*—We now ascend the roots of the mountain called Kastaniá, and begin to pass between it and the mountain of Alonístena, which is on our right. The latter is much higher than Kastaniá, and, like the other peaked summits of the Mænalian range, is covered with firs, and deeply at present with snow. The snow lies also in our pass. At a fountain in the road, the small village of Bazeníko is half a mile on the right, standing at the foot of the Mænalian range, and now covered with snow.

Saetá is the most lofty of the range of mountains, which are in face of Levidhi, to the northward and eastward; they are all a part of the chain which extends from Mount Khelmós, and connects that great summit with Artemisium, Parthenium, and Parnon. Mount Saetá is covered with firs. The mountain between the plain of Levidhi and Alonístena, or, to speak by the ancient nomenclature, that part of the Mæ-

ing the Mænalian range in spring. And then, lastly, you have the laurel and vine region, full of sweetness and Elysian beauty.

28. Now as Mercury is the ruling power of the hill enchantment, so Daphne of the leafy peace. She is, in her first life, the daughter of the mountain river, the mist of it filling the valley; the Sun, pursuing, and effacing it, from dell to dell, is, literally, Apollo pursuing Daphne, and *adverse* to her; (not, as in the earlier tradition, the Sun pursuing only his own light). Daphne, thus hunted, cries to her mother, the Earth, which opens, and receives her, causing the laurel to spring up in her stead. That is to say, wherever the rocks protect the mist from the sunbeam, and suffer it to water the earth, there the laurel and other richest vegetation fill the hollows, giving a better glory to the sun itself. For sunshine, on the torrent spray,

nalian range which separates the Orchomenia from the valleys of Helisson and Methydrium, is clothed also with large forests of the same trees; the road across this ridge from Lavídhí to Alonístena is now impracticable on account of the snow.

I am detained all day at Levídhí by a heavy fall of snow, which before the evening has covered the ground to half a foot in depth, although the village is not much elevated above the plain, nor in a more lofty situation than Tripolitzá.

March 4th.—Yesterday afternoon and during the night the snow fell in such quantities as to cover all the plains and adjacent mountains; and the country exhibited this morning as fine a snow-scene as Norway could supply. As the day advanced and the sun appeared, the snow melted rapidly, but the sky was soon overcast again, and the snow began to fall.

on the grass of its valley, and entangled among the laurel stems, or glancing from their leaves, became a thousand-fold lovelier and more sacred than the same sunbeams, burning on the leafless mountain-side.

And farther, the leaf, in its connection with the river, is typically expressive, not, as the flower was, of human fading and passing away, but of the perpetual flow and renewal of human mind and thought, rising "like the rivers that run among the hills"; therefore it was that the youth of Greece sacrificed their hair—the sign of their continually renewed strength,—to the rivers, and to Apollo. Therefore, to commemorate Apollo's own chief victory over death—over Python, the corrupter,—a laurel branch was gathered every ninth year in the vale of Tempe; and the laurel leaf became the reward or crown of all beneficent and enduring work of man—work of inspiration, born of the strength of the earth, and of the dew of heaven, and which can never pass away.

29. You may doubt at first, even because of its grace, this meaning in the fable of Apollo and Daphne; you will not doubt it, however, when you trace it back to its first eastern origin. When we speak carelessly of the traditions respecting the Garden of Eden, (or in Hebrew, remember, Garden of Delight,) we are apt to confuse Milton's descriptions with those in the book of Genesis. Milton fills his Paradise with flowers; but no flowers are spoken of in Genesis. We may indeed conclude that in speaking of every herb of the field, flowers are included. But they

are not named. The things that are *named* in the Garden of Delight are trees only.

The words are, "every tree that was pleasant to the sight and good for food ;" and as if to mark the idea more strongly for us in the Septuagint, even the ordinary Greek word for tree is not used, but the word *ξύλον*,—literally, every 'wood,' every piece of *timber* that was pleasant or good. They are indeed the "*vivi travi*,"—living rafters, of Dante's Apennine.

Do you remember how those trees were said to be watered ? Not by the four rivers only. The rivers could not supply the place of rain. No rivers do ; for in truth they are the refuse of rain. No storm-clouds were there, nor hidings of the blue by darkening veil ; but there went up a *mist* from the earth, and watered the face of the ground,—or, as in Septuagint and Vulgate, "There went forth a fountain from the earth, and gave the earth to drink."

30. And now, lastly, we continually think of that Garden of Delight, as if it existed, or could exist, no longer ; wholly forgetting that it is spoken of in Scripture as perpetually existent ; and some of its fairest trees as existent also, or only recently destroyed. When Ezekiel is describing to Pharaoh the greatness of the Assyrians, do you remember what image he gives of them ? "Behold, the Assyrian was a cedar in Lebanon, with fair branches ; and his top was among the thick boughs ; the waters nourished him, and the deep brought him up, with her rivers run-

ning round about his plants. Under his branches did all the beasts of the field bring forth their young; and under his shadow dwelt all great nations."

31. Now hear what follows. "The cedars *in the Garden of God* could not hide *him*. The fir trees were not like his boughs, and the chestnut trees were not like his branches; nor any tree in the Garden of God was like unto him in beauty."

So that you see, whenever a nation rises into consistent, vital, and, through many generations, enduring power, *there* is still the Garden of God; still it is the water of life which feeds the roots of it; and still the succession of its people is imaged by the perennial leafage of trees of Paradise. Could this be said of Assyria, and shall it not be said of England? How much more, of lives such as ours should be,—just, laborious, united in aim, beneficent in fulfilment, may the image be used of the leaves of the trees of Eden! Other symbols have been given often to show the evanescence and slightrness of our lives—the foam upon the water, the grass on the housetop, the vapour that vanishes away; yet none of these are images of true human life. That life, when it is real, is *not* evanescent; is *not* slight; does *not* vanish away. Every noble life leaves the fibre of it interwoven for ever in the work of the world; by so much, evermore, the strength of the human race has gained; more stubborn in the root, higher towards heaven in the branch; and, "as a tei tree, and as an oak,—whose substance is in them

when they cast their leaves,—so the holy seed is in the midst thereof.”

32. Only remember on what conditions. In the great Psalm of life, we are told that everything that a man doeth shall prosper, so only that he delight in the law of his God, that he hath not walked in the counsel of the wicked, nor sat in the seat of the scornful. Is it among these leaves of the perpetual Spring,—helpful leaves for the healing of the nations,—that we mean to have our part and place, or rather among the “brown skeletons of leaves that lag, the forest brook along”? For other leaves there are, and other streams that water them,—not water of life, but water of Acheron. Autumnal leaves there are that strew the brooks, in Vallombrosa. Remember you how the name of the place was changed: “Once called ‘Sweet water’ (Aqua bella), now, the Shadowy Vale.” Portion in one or other name we must choose, all of us,—with the living olive, by the living fountains of waters, or with the wild fig trees, whose leafage of human soul is strewed along the brooks of death, in the eternal Vallombrosa.

CHAPTER IV.

THE FLOWER.

ROME, *Whit Monday*, 1874.

1. ON the quiet road leading from under the Palatine to the little church of St. Nereo and Achilleo, I met, yesterday morning, group after group of happy peasants heaped in pyramids on their triumphal carts, in Whit-Sunday dress, stout and clean, and gay in colour; and the women all with bright artificial roses in their hair, set with true natural taste, and well becoming them. This power of arranging wreath or crown of flowers for the head, remains to the people from classic times. And the thing that struck me most in the look of it was not so much the cheerfulness, as the dignity;—in a true sense, the *becomingness* and decorousness of the ornament. Among the ruins of the dead city, and the worse desolation of the work of its modern rebuilders, here was one element at least of honour, and order;—and, in these, of delight.

And these are the real significances of the flower itself. It is the utmost purification of the plant, and the utmost discipline. Where its tissue is blanched fairest, dyed purest, set in strictest rank, appointed to most chosen office,

there—and created by the fact of this purity and function—is the flower.

2. But created, observe, by the purity and order, more than by the function. The flower exists for its own sake,—not for the fruit's sake. The production of the fruit is an added honour to it—is a granted consolation to us for its death. But the flower is the end of the seed,—not the seed of the flower. You are fond of cherries, perhaps; and think that the use of cherry blossom is to produce cherries. Not at all. The use of cherries is to produce cherry blossoms; just as the use of bulbs is to produce hyacinths,—not of hyacinths to produce bulbs. Nay, that the flower can multiply by bulb, or root, or slip, as well as by seed, may show you at once how immaterial the seed-forming function is to the flower's existence. A flower is to the vegetable substance what a crystal is to the mineral. “Dust of sapphire,” writes my friend Dr. John Brown to me, of the wood hyacinths of Scotland in the spring. Yes, that is so,—each bud more beautiful, itself, than perfectest jewel—*this*, indeed, jewel “of purest ray serene;” but, observe you, the glory is in the purity, the serenity, the radiance,—not in the mere continuance of the creature.

3. It is because of its beauty that its continuance is worth Heaven's while. The glory of it is in being,—not in begetting; and in the spirit and substance,—not the change. For the earth also has its flesh and spirit. Every day of spring is the earth's Whit Sunday—Fire

Sunday. The falling fire of the rainbow, with the order of its zones, and the gladness of its covenant,—you may eat of it, like Esdras ; but you feed upon it only that you may see it. Do you think that flowers were born to nourish the blind ?

Fasten well in your mind, then, the conception of order, and purity, as the essence of the flower's being, no less than of the crystal's. A ruby is not made bright to scatter round it child-rubies ; nor a flower, but in collateral and added honour, to give birth to other flowers.

Two main facts, then, you have to study in every flower: the symmetry or order of it, and the perfection of its substance ; first, the manner in which the leaves are placed for beauty of form ; then the spinning and weaving and blanching of their tissue, for the reception of purest colour, or refining to richest surface.

4. First, the order: the proportion, and answering to each other, of the parts ; for the study of which it becomes necessary to know what its parts are ; and that a flower consists essentially of—— Well, I really don't know what it consists essentially of. For some flowers have bracts, and stalks, and toruses, and calices, and corollas, and discs, and stamens, and pistils, and ever so many odds and ends of things besides, of no use at all, seemingly ; and others have no bracts, and no stalks, and no toruses, and no calices, and no corollas, and nothing recognizable for stamens or pistils,—only, when they come to be reduced to this kind of poverty, one doesn't call

them flowers ; they get together in knots, and one calls them catkins, or the like, or forgets their existence altogether ;—I haven't the least idea, for instance, myself, what an oak blossom is like ; only I know its bracts get together and make a cup of themselves afterwards, which the Italians call, as they do the dome of St. Peter's, 'cupola' ; and that it is a great pity, for their own sake as well as the world's, that they were not content with their ilex cupolas, which were made to hold something, but took to building these big ones upside-down, which hold nothing—*less* than nothing,—large extinguishers of the flame of Catholic religion. And for farther embarrassment, a flower not only is without essential consistence of a given number of parts, but it rarely consists, alone, of *itself*. One talks of a hyacinth as of a flower ; but a hyacinth is any number of flowers. One does not talk of 'a heather' ; when one says 'heath,' one means the whole plant, not the blossom,—because heath-bells, though they grow together for company's sake, do so in a voluntary sort of way, and are not fixed in their places ; and yet, they depend on each other for effect, as much as a bunch of grapes.

5. And this grouping of flowers, more or less waywardly, is the most subtle part of their order, and the most difficult to represent. Take that cluster of bog-heather bells, for instance, Line-study 1. You might think at first there were no lines in it worth study ; but look at it more carefully. There are twelve bells in the

cluster. There may be fewer, or more; but the bog-heath is apt to run into something near that number. They all grow together as close as they can, and on one side of the supporting branch only. The natural effect would be to bend the branch down; but the branch won't have that, and so leans back to carry them. Now you see the use of drawing the profile in the middle figure: it shows you the exactly balanced setting of the group,—not drooping, nor erect; but with a disposition to droop, tossed up by the leaning back of the stem. Then, growing as near as they can to each other, those in the middle get squeezed. Here is another quite special character. Some flowers don't like being squeezed at all (fancy a squeezed convolvulus!); but these heather bells like it, and look all the prettier for it,—not the squeezed ones exactly, by themselves, but the cluster altogether, by their patience.

Then also the outside ones get pushed into a sort of star-shape, and in front show the colour of all their sides, and at the back the rich green cluster of sharp leaves that hold them; all this order being as essential to the plant as any of the more formal structures of the bell itself.

6. But the bog-heath has usually only one cluster of flowers to arrange on each branch. Take a spray of ling (Frontispiece), and you will find that the richest piece of Gothic spire-sculpture would be dull and graceless beside the grouping of the floral masses in their various life. But it is difficult to give the accuracy of attention neces-

sary to see their beauty without drawing them; and still more difficult to draw them in any approximation to the truth before they change. This is indeed the fatallest obstacle to all good botanical work. Flowers, or leaves,—and especially the last,—can only be rightly drawn as they grow. And even then, in their loveliest spring action, they grow as you draw them, and will not stay quite the same creatures for half an hour.

7. I said in my inaugural lectures at Oxford, § 107, that real botany is not so much the description of plants as their biography. Without entering at all into the history of its fruitage, the life and death of the blossom *itself* is always an eventful romance, which must be completely told, if well. The grouping given to the various states of form between bud and flower is always the most important part of the design of the plant; and in the modes of its death are some of the most touching lessons, or symbolisms, connected with its existence. The utter loss and far-scattered ruin of the cistus and wild rose,—the dishonoured and dark contortion of the convolvulus,—the pale wasting of the crimson heath of Apennine, are strangely opposed by the quiet closing of the brown bells of the ling, each making of themselves a little cross as they die; and so enduring into the days of winter. I have drawn the faded beside the full branch, and know not which is the more beautiful.

8. This grouping, then, and way of treating each other in their gathered company, is the first and most subtle

condition of form in flowers; and, observe, I don't mean, just now, the appointed and disciplined grouping, but the wayward and accidental. Don't confuse the beautiful consent of the cluster in these sprays of heath with the legal strictness of a foxglove,—though that also has its divinity; but of another kind. That legal order of blossoming—for which we may wisely keep the accepted name, 'inflorescence,'—is itself quite a separate subject of study, which we cannot take up until we know the still more strict laws which are set over the flower itself.

9. I have in my hand a small red poppy which I gathered on Whit Sunday on the palace of the Cæsars. It is an intensely simple, intensely floral, flower. All silk and flame: a scarlet cup, perfect-edged all round, seen among the wild grass far away, like a burning coal fallen from Heaven's altars. You cannot have a more complete, a more stainless, type of flower absolute; inside and outside, *all* flower. No sparing of colour anywhere—no outside coarsenesses—no interior secrecies; open as the sunshine that creates it; fine-finished on both sides, down to the extremest point of insertion on its narrow stalk; and robed in the purple of the Cæsars.

Literally so. That poppy scarlet, so far as it could be painted by mortal hand, for mortal King, stays yet, against the sun, and wind, and rain, on the walls of the house of Augustus, a hundred yards from the spot where I gathered the weed of its desolation.

10. A pure *cup*, you remember it is; that much at least

you cannot but remember, of poppy-form among the corn-fields; and it is best, in beginning, to think of every flower as essentially a cup. There are flat ones, but you will find that most of these are really groups of flowers, not single blossoms; and there are out-of-the-way and quaint ones, very difficult to define as of any shape; but even these have a cup to begin with, deep down in them. You had better take the idea of a cup or vase, as the first, simplest, and most general form of true flower.

The botanists call it a corolla, which means a garland, or a kind of crown; and the word is a very good one, because it indicates that the flower-cup is made, as our clay cups are, on a potter's wheel; that it is essentially a *revolute* form—a whirl or (botanically) 'whorl' of leaves; in reality successive round the base of the urn they form.

11. Perhaps, however, you think poppies in general are not much like cups. But the flower in my hand is a—poverty-*stricken* poppy, I was going to write,—poverty-*strengthened* poppy, I mean. On richer ground, it would have gushed into flaunting breadth of untenable purple—flapped its inconsistent scarlet vaguely to the wind—dropped the pride of its petals over my hand in an hour after I gathered it. But this little rough-bred thing, a Campagna pony of a poppy, is as bright and strong to-day as yesterday. So that I can see exactly where the leaves join or lap over each other; and when I look down into the cup, find it to be composed of four leaves altogether,—two smaller, set within two larger.

12. Thus far (and somewhat farther) I had written in Rome ; but now, putting my work together in Oxford, a sudden doubt troubles me, whether all poppies have two petals smaller than the other two. Whereupon I take down an excellent little school-book on botany—the best I've yet found, thinking to be told quickly ; and I find a great deal about opium ; and, apropos of opium, that the juice of common celandine is of a bright orange colour ; and I pause for a bewildered five minutes, wondering if a celandine is a poppy, and how many petals *it* has : going on again—because I must, without making up my mind, on either question—I am told to “observe the floral receptacle of the Californian genus *Eschscholtzia*.” Now I can't observe anything of the sort, and I don't want to ; and I wish California and all that's in it were at the deepest bottom of the Pacific. Next I am told to compare the poppy and waterlily ; and I can't do that, neither—though I should like to ; and there's the end of the article ; and it never tells me whether one pair of petals is always smaller than the other, or not. Only I see it says the corolla has four petals. Perhaps a celandine may be a double poppy, and have eight, I know they're tiresome irregular things, and I mustn't be stopped by them ; *—at

* Just in time, finding a heap of gold under an oak tree some thousand years old, near Arundel, I've made them out : Eight, divided by three ; that is to say, three couples of petals, with two odd little ones inserted for form's sake. No wonder I couldn't decipher them by memory.

any rate, my Roman poppy knew what it was about, and had its two couples of leaves in clear subordination, of which at the time I went on to inquire farther, as follows.

13. The next point is, what shape are the petals of? And that is easier asked than answered; for when you pull them off, you find they won't lie flat, by any means, but are each of them cups, or rather shells, themselves; and that it requires as much conchology as would describe a cockle, before you can properly give account of a single poppy leaf. Or of a single *any* leaf—for all leaves are either shells, or boats, (or solid, if not hollow, masses,) and cannot be represented in flat outline. But, laying these as flat as they will lie on a sheet of paper, you will find the piece they hide of the paper they lie on can be drawn; giving approximately the shape of the outer leaf as at A, that of the inner as at B, Fig. 4; which you will find very difficult lines to draw, for they are each composed of two curves, joined, as in Fig. 5; all above the line *a b* being the outer edge of the leaf, but joined so subtly to the side that the least break in drawing the line spoils the form.

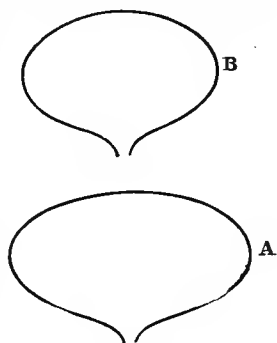


FIG. 4.

14. Now every flower petal consists essentially of these two parts, variously proportioned and outlined. It ex-

pands from C to $a\ b$; and closes in the external line, and for this reason.

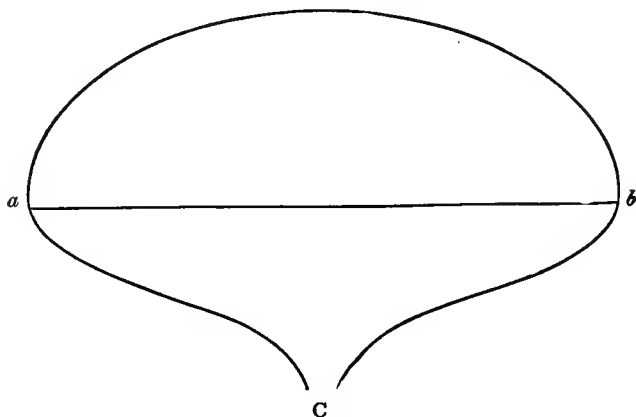


FIG. 5.

Considering every flower under the type of a cup, the first part of the petal is that in which it expands from the bottom to the rim; the second part, that in which it terminates itself on reaching the rim. Thus let the three circles, A B C, Fig 6., represent the undivided cups of the three great geometrical orders of flowers—trefoil, quatrefoil and cinquefoil.

Draw in the first an equilateral triangle, in the second a square, in the third a pentagon; draw the dark lines from centres to angles; (D E F): then (*a*) the third part of D; (*b*) the fourth part of E, (*c*) the fifth part of F, are the normal outline forms of the petals of the three fami

lies; the relations between the developing angle and limiting curve being varied according to the depth of cup, and the degree of connection between the petals. Thus a rose folds them over one another, in the bud; a convolvulus twists them,—the one expanding into a flat cinquefoil of separate petals, and the other into a deep-welled cinquefoil of connected ones.

I find an excellent illustration in *Veronica Polita*, one of the most perfectly graceful of field plants because of the light alternate flower stalks, each with its leaf at the base; the flower itself a quatrefoil, of which the largest

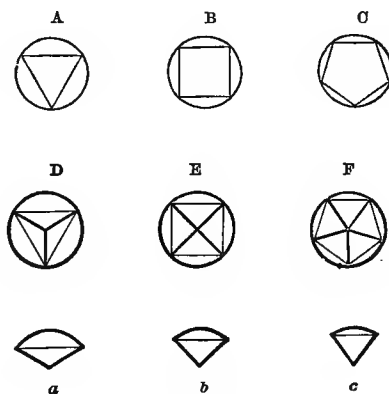


FIG. 6.

and least petals are uppermost. Pull one off its calyx (draw, if you can, the outline of the striped blue upper petal with the jagged edge of pale gold below), and then examine the relative shapes of the lateral, and least upper

petal. Their under surface is very curious, as if covered with white paint; the blue stripes above, in the direction of their growth, deepening the more delicate colour with exquisite insistence.

A lilac blossom will give you a pretty example of the expansion of the petals of a quatrefoil above the edge of the cup or tube; but I must get back to our poppy at present.

15. What outline its petals really have, however, is little shown in their crumpled fluttering; but that very crumpling arises from a fine floral character which we do not enough value in them. We usually think of the poppy as a coarse flower; but it is the most transparent and delicate of all the blossoms of the field. The rest—nearly all of them—depend on the *texture* of their surfaces for colour. But the poppy is painted *glass*; it never glows so brightly as when the sun shines through it. Wherever it is seen—against the light or with the light—always, it is a flame, and warms the wind like a blown ruby.

In these two qualities, the accurately balanced form, and the perfectly infused colour of the petals, you have, as I said, the central being of the flower. All the other parts of it are necessary, but we must follow them out in order.

16. Looking down into the cup, you see the green boss divided by a black star,—of six rays only,—and surrounded by a few black spots. My rough-nurtured poppy contents itself with these for its centre; a rich one would have had the green boss divided by a dozen of rays, and surrounded by a dark crowd of crested threads.

This green boss is called by botanists the pistil, which word consists of the two first syllables of the Latin pistillum, otherwise more familiarly Englished into 'pestle.' The meaning of the botanical word is of course, also, that the central part of a flower-cup has to it something of the relations that a pestle has to a mortar! Practically, however, as this pestle has no pounding functions, I think the word is misleading as well as ungraceful; and that we may find a better one after looking a little closer into the matter. For this pestle is divided generally into three very distinct parts: there is a storehouse at the bottom of it for the seeds of the plant; above this, a shaft, often of considerable length in deep cups, rising to the level of their upper edge, or above it; and at the top of these shafts an expanded crest. This shaft the botanists call 'style,' from the Greek word for a pillar; and the crest of it—I do not know why—stigma, from the Greek word for 'spot.' The storehouse for the seeds they call the 'ovary,' from the Latin ovum, an egg. So you have two-thirds of a Latin word, (pistil)—awkwardly and disagreeably edged in between pestle and pistol—for the whole thing; you have an English-Latin word (ovary) for the bottom of it; an English-Greek word (style) for the middle; and a pure Greek word (stigma) for the top.

17. This is a great mess of language, and all the worse that the words style and stigma have both of them quite different senses in ordinary and scholarly English from this forced botanicaal one. And I will venture therefore,

for my own pupils, to put the four names altogether into English. Instead of calling the whole thing a pistil, I shall simply call it the pillar. Instead of 'ovary,' I shall say 'Treasury' (for a seed isn't an egg, but it *is* a treasure). The style I shall call the 'Shaft,' and the stigma the 'Volnte.' So you will have your entire pillar divided into the treasury, at its base, the shaft, and the volute; and I think you will find these divisions easily remembered, and not unfitted to the sense of the words in their ordinary use.

18. Round this central, but, in the poppy, very stumpy, pillar, you find a cluster of dark threads, with dusty pendants or cups at their ends. For these the botanists' name 'stamens,' may be conveniently retained, each consisting of a 'filament,' or thread, and an 'anther,' or blossoming part.

And in this rich corolla, and pillar, or pillars, with their treasuries, and surrounding crowd of stamens, the essential flower consists. Fewer than these several parts, it cannot have, to be a flower at all; of these, the corolla leads, and is the object of final purpose. The stamens and the treasuries are only there in order to produce future corollas, though often themselves decorative in the highest degree.

These, I repeat, are all the essential parts of a flower. But it would have been difficult, with any other than the poppy, to have shown you them alone; for nearly all other flowers keep with them, all their lives, their nurse

or tutor leaves,—the group which, in stronger and humbler temper, protected them in their first weakness, and formed them to the first laws of their being. But the poppy casts these tutorial leaves away. It is the finished picture of impatient and luxury-loving youth,—at first too severely restrained, then casting all restraint away,—yet retaining to the end of life unseemly and illiberal signs of its once compelled submission to laws which were only pain,—not instruction.

19. Gather a green poppy bud, just when it shows the scarlet line at its side; break it open and unpack the poppy. The whole flower is there complete in size and colour,—its stamens full-grown, but all packed so closely that the fine silk of the petals is crushed into a million of shapeless wrinkles. When the flower opens, it seems a deliverance from torture: the two imprisoning green leaves are shaken to the ground; the aggrieved corolla smooths itself in the sun, and comforts itself as it can; but remains visibly crushed and hurt to the end of its days.

20. Not so flowers of gracious breeding. Look at these four stages in the young life of a primrose, Fig. 7. First confined, as strictly as the poppy within five pinching green leaves, whose points close over it, the little thing is content to remain a child, and finds its nursery large enough. The green leaves uncloseth their points,—the little yellow ones peep out, like ducklings. They find the light delicious, and open wide to it; and grow, and grow,

and throw themselves wider at last into their perfect rose. But they never leave their old nursery for all that; it and they live on together; and the nursery seems a part of the flower.

21. Which is so, indeed, in all the loveliest flowers; and, in usual botanical parlance, a flower is said to consist of its calyx, (or *hiding* part—Calypso having rule over



FIG. 7.

it,) and corolla, or garland part, Proserpina having rule over it. But it is better to think of them always as separate; for this calyx, very justly so named from its main function of concealing the flower, in its youth is usually green, not coloured, and shows its separate nature by pausing, or at least greatly lingering, in its growth, and modifying itself very slightly, while the corolla is forming

itself through active change. Look at the two, for instance, through the youth of a pease blossom, Fig. 8.



FIG. 8.

The entire cluster at first appears pendent in this manner, the stalk bending round on purpose to put it into that position. On which all the little buds, thinking themselves ill-treated, determine not to submit to anything of the sort, turn their points upward persistently, and determine that—at any cost of trouble—they will get nearer the sun. Then they begin to open, and let out their corollas. I give the process of one only (Fig. 9).^{*} It chanced to be engraved the reverse way from the bud; but that is of no consequence.

At first, you see the long lower point of the calyx thought that *it* was going to be the head of the family, and curls upwards eagerly. Then the little corolla steals out; and soon does away with that impression on the mind of the calyx. The corolla soars up with widening wings, the abashed calyx retreats beneath; and finally the great upper leaf of corolla—not pleased at having its back still

^{*} Figs. 8 and 9 are both drawn and engraved by Mr. Burgess.

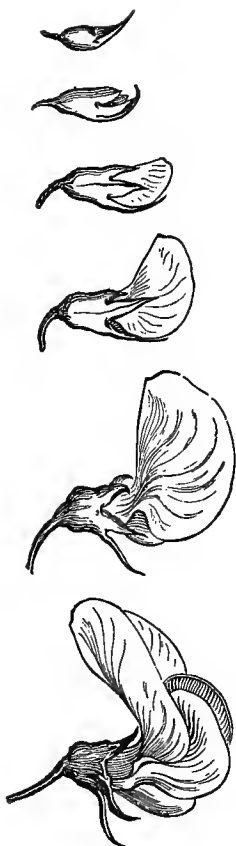


FIG. 9.

turned to the light, and its face down—throws itself entirely back, to look at the sky, and nothing else ;—and your blossom is complete.

Keeping, therefore, the ideas of calyx and corolla entirely distinct, this one general point you may note of both : that, as a calyx is originally folded tight over the flower, and has to open deeply to let it out, it is nearly always composed of sharp pointed leaves like the segments of a balloon ; while corollas, having to open out as wide as possible to show themselves, are typically like cups or plates, only cut into their edges here and there, for ornamentation's sake.

22. And, finally, though the corolla is essentially the floral group of leaves, and usually receives the glory of colour for itself only, this glory and delight may be given to any other part of the group ; and, as if to show us that there is no

really dishonoured or degraded membership, the stalks and leaves in some plants, near the blossom, flush in sympathy with it, and become themselves a part of the effect

ively visible flower;—Eryngo—Jura hyacinth, (comosus,) and the edges of upper stems and leaves in many plants; while others, (Geranium lucidum,) are made to delight us with their leaves rather than their blossoms; only I suppose, in these, the scarlet leaf colour is a kind of early autumnal glow,—a beautiful hectic, and foretaste, in sacred youth, of sacred death.

I observe, among the speculations of modern science, several, lately, not uningenious, and highly industrious, on the subject of the relation of colour in flowers, to insects—to selective development, etc., etc. There *are* such relations, of course. So also, the blush of a girl, when she first perceives the faltering in her lover's step as he draws near, is related essentially to the existing state of her stomach; and to the state of it through all the years of her previous existence. Nevertheless, neither love, chastity, nor blushing, are merely exponents of digestion.

All these materialisms, in their unclean stupidity, are essentially the work of human bats; men of semi-faculty or semi-education, who are more or less incapable of so much as seeing, much less thinking about, colour; among whom, for one-sided intensity, even Mr. Darwin must be often ranked, as in his vespertilian treatise on the ocelli of the Argus pheasant, which he imagines to be artistically gradated, and perfectly imitative of a ball and socket. If I had him here in Oxford for a week, and could force him to try to copy a feather by Bewick, or to draw for himself a boy's thumb'd marble, his notions of feathers, and balls,

would be changed for all the rest of his life. But his ignorance of good art is no excuse for the acutely illogical simplicity of the rest of his talk of colour in the "Descent of Man." Peacocks' tails, he thinks, are the result of the admiration of blue tails in the minds of well-bred peahens,—and similarly, mandrills' noses the result of the admiration of blue noses in well-bred baboons. But it never occurs to him to ask why the admiration of blue noses is healthy in baboons, so that it develops their race properly, while similar maidenly admiration either of blue noses or red noses in men would be improper, and develop the race improperly. The word itself 'proper' being one of which he has never asked, or guessed, the meaning. And when he imagined the gradation of the cloudings in feathers to represent successive generation, it never occurred to him to look at the much finer cloudy gradations in the clouds of dawn themselves; and explain the modes of sexual preference and selective development which had brought *them* to their scarlet glory, before the cock could crow thrice. Putting all these vespertilian speculations out of our way, the human facts concerning colour are briefly these. Wherever men are noble, they love bright colour; and wherever they can live healthily, bright colour is given them—in sky, sea, flowers, and living creatures.

On the other hand, wherever men are ignoble and sensual, they endure without pain, and at last even come to like (especially if artists,) mud-colour and black, and to dislike rose-colour and white. And wherever it is unhealthy for

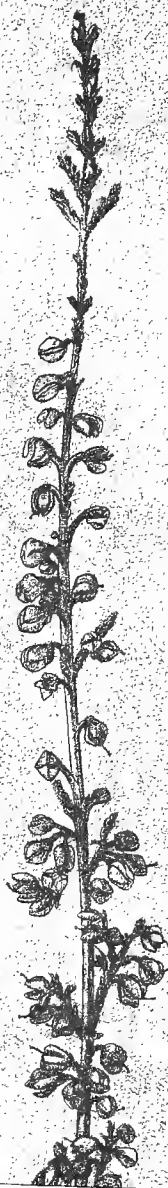


LINE-STUDY I.

ERICA TETRALIX.







them to live, the poisonousness of the place is marked by some ghastly colour in air, earth, or flowers.

There are, of course, exceptions to all such widely founded laws; there are poisonous berries of scarlet, and pestilential skies that are fair. But, if we once honestly compare a venomous wood-fungus, rotting into black dissolution of dripped slime at its edges, with a spring gentian; or a puff adder with a salmon trout, or a fog in Bermondsey with a clear sky at Berne, we shall get hold of the entire question on its right side; and be able afterwards to study at our leisure, or accept without doubt or trouble, facts of apparently contrary meaning. And the practical lesson which I wish to leave with the reader is, that lovely flowers, and green trees growing in the open air, are the proper guides of men to the places which their Maker intended them to inhabit; while the flowerless and treeless deserts—of reed, or sand, or rock,—are meant to be either heroically invaded and redeemed, or surrendered to the wild creatures which are appointed for them; happy and wonderful in their wild abodes.

Nor is the world so small but that we may yet leave in it also unconquered spaces of beautiful solitude; where the chamois and red deer may wander fearless,—nor any fire of avarice scorch from the Highlands of Alp, or Gram-pian, the rapture of the heath, and the rose,

CHAPTER V.

PAP AVER RHOEAS.

BRANTWOOD, *July 11th*, 1875.

1. CHANCING to take up yesterday a favourite old book, Mavor's *British Tourists*, (London, 1798,) I found in its fourth volume a delightful diary of a journey made in 1782 through various parts of England, by Charles P. Moritz of Berlin.

And in the fourteenth page of this diary I find the following passage, pleasantly complimentary to England:—

“The slices of bread and butter which they give you with your tea are as thin as poppy leaves. But there is another kind of bread and butter usually eaten with tea, which is toasted by the fire, and is incomparably good. This is called ‘toast.’”

I wonder how many people, nowadays, whose bread and butter was cut too thin for them, would think of comparing the slices to poppy leaves? But this was in the old days of travelling, when people did not whirl themselves past corn-fields, that they might have more time to walk on paving-stones; and understood that pop-

pies did not mingle their scarlet among the gold, without some purpose of the poppy-Maker that they should be looked at.

Nevertheless, with respect to the good and polite German's poetically-contemplated, and finely æsthetic, tea, may it not be asked whether poppy leaves themselves, like the bread and butter, are not, if we may venture an opinion—*too* thin,—*improperly* thin? In the last chapter, my reader was, I hope, a little anxious to know what I meant by saying that modern philosophers did not know the meaning of the word 'proper,' and may wish to know what I mean by it myself. And this I think it needful to explain before going farther.

2. In our English prayer-book translation, the first verse of the ninety-third Psalm runs thus: "The Lord is King; and hath put on glorious apparel." And although, in the future republican world, there are to be no lords, no kings, and no glorious apparel, it will be found convenient, for botanical purposes, to remember what such things once were; for when I said of the poppy, in last chapter, that it was "robed in the purple of the Cæsars," the words gave, to any one who had a clear idea of a Cæsar, and of his dress, a better, and even *stricter*, account of the flower than if I had only said, with Mr. Sowerby, "petals bright scarlet;" which might just as well have been said of a pimpermel, or scarlet geranium;—but of neither of these latter should I have said "robed in purple of Cæsars." What I meant was, first, that the poppy leaf

looks dyed through and through, like glass, or Tyrian tissue; and not merely painted: secondly, that the splendour of it is proud,—almost insolently so. Augustus, in his glory, might have been clothed like one of these; and Saul; but not David, nor Solomon; still less the teacher of Solomon, when He puts on ‘glorious apparel.’

3. Let us look, however, at the two translations of the same verse.

In the vulgate it is “*Dominus regnavit; decorem indutus est;*” He has put on ‘becomingness,’—decent apparel, rather than glorious.

In the Septuagint it is *ευπρεπειὰ*—*well-becomingness*; an expression which, if the reader considers, must imply certainly the existence of an opposite idea of possible ‘*ill-becomingness*,’—of an apparel which should, in just as accurate a sense, belong appropriately to the creature invested with it, and yet not be glorious, but inglorious, and not well-becoming, but ill-becoming. The mandrill’s blue nose, for instance, already referred to,—can we rightly speak of this as ‘*ευπρεπειὰ*’? Or the stings, and minute, colourless blossoming of the nettle? May we call these a glorious apparel, as we may the glowing of an alpine rose?

You will find on reflection, and find more convincingly the more accurately you reflect, that there is an absolute sense attached to such words as ‘decent,’ ‘honourable,’ ‘glorious,’ or ‘*καλός*,’ contrary to another absolute sense in the words ‘indecent,’ ‘shameful,’ ‘vile,’ or ‘*αἰσχος*.’

And that there is every degree of these absolute qualities visible in living creatures; and that the divinity of the Mind of man is in its essential discernment of what is *καλον* from what is *αισχρον*, and in his preference of the kind of creatures which are decent, to those which are indecent; and of the kinds of thoughts, in himself, which are noble, to those which are vile.

4. When therefore I said that Mr. Darwin, and his school,* had no conception of the real meaning of the word 'proper,' I meant that they conceived the qualities of things only as their 'properties,' but not as their 'becomingnesses;' and seeing that dirt is proper to a swine, malice to a monkey, poison to a nettle, and folly to a fool, they called a nettle *but* a nettle, and the faults of fools *bnt* folly; and never saw the difference between ugliness and beauty absolute, decency and indecency absolute, glory or shame absolute, and folly or sense absolute.

Whereas, the perception of beauty, and the power of defining physical character, are based on moral instinct, and on the power of defining animal or human character. Nor is it possible to say that one flower is more highly developed, or one animal of a higher order, than another, without the assumption of a divine law of perfection to which the one more conforms than the other.

5. Thus, for instance. That it should ever have been an open question with me whether a poppy had always

* Of Vespertilian science generally, compare 'Eagles' Nest,' pp. 25 and 179.

two of its petals less than the other two, depended wholly on the hurry and imperfection with which the poppy car-

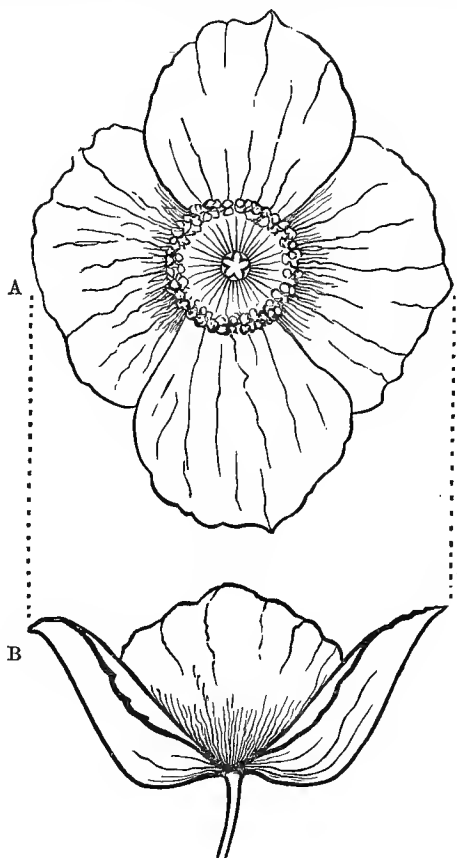


FIG. 10.

ries out its plan. It never would have occurred to me to

doubt whether an iris had three of its leaves smaller than the other three, because an iris always completes itself to its own ideal. Nevertheless, on examining various poppies, as I have walked, this summer, up and down the hills between Sheffield and Wakefield, I find the subordination of the upper and lower petals entirely necessary and normal; and that the result of it is to give two distinct profiles to the poppy cup, the difference between which, however, we shall see better in the yellow Welsh poppy, at present called *Meconopsis Cambrica*; but which, in the Oxford schools, will be '*Papaver cruciforme*'—'*Crosslet Poppy*,'—first, because all our botanical names must be in Latin if possible; Greek only allowed when we can do no better; secondly, because *meconopsis* is barbarous Greek; thirdly, and chiefly, because it is little matter whether this poppy be Welsh or English; but very needful that we should observe, wherever it grows, that the petals are arranged in what used to be, in my young days, called a diamond shape,* as at A, Fig. 10, the two narrow inner ones at right angles to, and projecting farther than, the two outside broad ones; and that the two broad ones, when the flower is seen in profile, as at B, show their margins folded back, as indicated by the thicker lines, and have a profile curve, which is only the softening, or melting away into each other, of two straight lines. Indeed, when the flower is younger, and quite strong, both its pro-

* The mathematical term is '*rhomb*.'

files, A and B, Fig. 11, are nearly straight-sided; and always, be it young or old, one broader than the other, so as to give the flower, seen from above, the shape of a contracted cross, or crosslet.

6. Now I find no notice of this flower in Gerarde; and

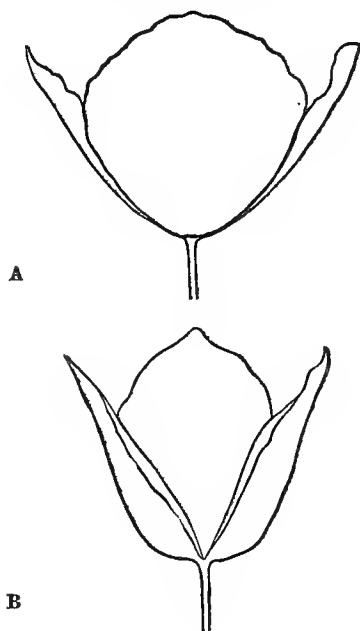
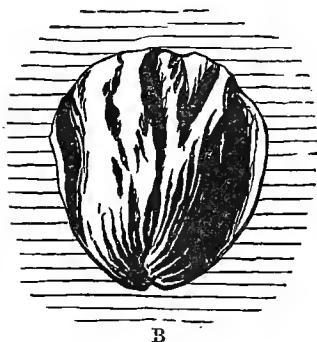
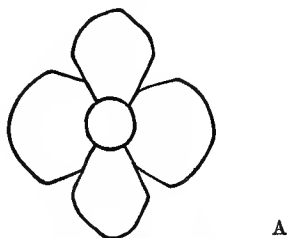


FIG. 11.

in Sowerby, out of eighteen lines of closely printed descriptive text, no notice of its crosslet form, while the petals are only stated to be "roundish-concave," terms equally applicable to at least one-half of all flower petals in the

world. The leaves are *said* to be very deeply pinnately partite ; but *drawn*—as neither pinnate nor partite !

And this is your modern cheap science, in ten volumes. Now I haven't a quiet moment to spare for drawing this morning ; but I merely give the main relations of the



B
FIG. 12.

petals, A, and blot in the wrinkles of one of the lower ones, B, Fig. 12 ; and yet in this rude sketch you will feel, I believe, there is something specific which could not belong to any other flower. But all proper description is

impossible without careful profiles of each petal laterally and across it. Which I may not find time to draw for any poppy whatever, because they none of them have well-becomingness enough to make it worth my while, being all more or less weedy, and ungracious, and mingled of good and evil. Whereupon rises before me, ghostly and untenable, the general question, 'What is a weed?' and, impatient for answer, the particular question, What is a poppy? I choose, for instance, to call this yellow flower a poppy, instead of a "likeness to poppy," which the botanists meant to call it, in their bad Greek. I choose also to call a poppy, what the botanists have called "glaucous thing," (glaucium). But where and when shall I stop calling things poppies? This is certainly a question to be settled at once, with others appertaining to it.

7. In the first place, then, I mean to call every flower either one thing or another, and not an 'accous' thing, only half something or half another. I mean to call this plant now in my hand, either a poppy or not a poppy; but not poppaceous. And this other, either a thistle or not a thistle; but not thistlaceous. And this other, either a nettle or not a nettle; but not nettlaceous. I know it will be very difficult to carry out this principle when tribes of plants are much extended and varied in type: I shall persist in it, however, as far as possible; and when plants change so much that one cannot with any conscience call them by their family name any more, I shall put them aside somewhere among families of poor relations, not

to be minded for the present, until we are well acquainted with the better bred circles. I don't know, for instance, whether I shall call the Burnet 'Grass-rose,' or put it out of court for having no petals; but it certainly shall not be called rosaceous; and my first point will be to make sure of my pupils having a clear idea of the central and unquestionable forms of thistle, grass, or rose, and assigning to them pure Latin, and pretty English, names,—classical, if possible; and at least intelligible and decorous.

8. I return to our present special question, then, What is a poppy? and return also to a book I gave away long ago, and have just begged back again, Dr. Lindley's *Ladies' Botany*. For without at all looking upon ladies as inferior beings, I dimly hope that what Dr. Lindley considers likely to be intelligible to *them*, may be also clear to their very humble servant.

The poppies, I find, (page 19, vol. i.) differ from crowfeet in being of a stupifying instead of a burning nature, and in generally having two sepals and twice two petals; "but as some poppies have three sepals, and twice three petals, the number of these parts is not sufficiently constant to form an essential mark." Yes, I know that, for I found a superb six-petaled poppy, spotted like a cistus, the other day in a friend's garden. But then, what makes it a poppy still? That it is of a stupifying nature, and itself so stupid that it does not know how many petals it should have, is surely not enough distinction?

9. Returning to Lindley, and working the matter far-

ther out with his help, I think this definition might stand. "A poppy is a flower which has either four or six petals, and two or more treasuries, united into one ; containing a milky, stupifying fluid in its stalks and leaves, and always throwing away its calyx when it blossoms."

And indeed, every flower which unites all these characters, we shall, in the Oxford schools, call 'poppy,' and 'Papaver;' but when I get fairly into work, I hope to fix my definitions into more strict terms. For I wish all my pupils to form the habit of asking, of every plant, these following four questions, in order, corresponding to the subject of these opening chapters, namely, "What root has it? what leaf? what flower? and what stem?" And, in this definition of poppies, nothing whatever is said about the root; and not only I don't know myself what a poppy root is like, but in all Sowerby's poppy section, I find no word whatever about that matter.

10. Leaving, however, for the present, the root unthought of, and contenting myself with Dr. Lindley's characteristics, I shall place, at the head of the whole group, our common European wild poppy, *Papaver Rhoeas*, and, with this, arrange the nine following other flowers thus,—opposite.

I must be content at present with determining the Latin names for the Oxford schools; the English ones I shall give as they chance to occur to me, in Gerard and the classical poets who wrote before the English revolution. When no satisfactory name is to be found, I must try to

V. PAPAVER RHOEAS.

NAME IN OXFORD CATALOGUE.	DIOSCORIDES.	In present Botany.
1. Papaver Rhoeas . . .	<i>μηκων ροας</i> . . .	Papaver Rhoeas
2. P. Hortense . . .	<i>μ. κηπευτη</i> * . . .	P. Hortense
3. P. Elatum . . .	<i>μ. θυμακίτης</i> † . . .	P. Lamottei
4. P. Argemone . . .		P. Argemone
5. P. Echinopsium . . .		P. Hybridum
6. P. Violaceum . . .		Roemeria Hybridæ
7. P. Cruciiforme . . .		Meconopsis Cambrica
8. P. Corniculatum . . .	<i>μ. κερατίτης</i> . . .	Glaucium Corniculatum
9. P. Litorale . . .	<i>μ. παραλίου</i> . . .	Glaucium Luteum
10. P. Chelidonium . . .		Chelidonium Majus

* ἦς τὸ στέγμα ἀποτομίζεται.

† ἐνλίμνης ἔχουσα τὸ κεφάλαιον. Dioscorides makes no effort to distinguish species, but gives the different names as if merely used in different places.

invent one ; as, for instance, just now, I don't like Gerarde's 'Corn-rose' for *Papaver Rhoeas*, and must coin another ; but this can't be done by thinking ; it will come into my head some day, by chance. I might try at it straightforwardly for a week together, and not do it.

The Latin names must be fixed at once, somehow ; and therefore I do the best I can, keeping as much respect for the old nomenclature as possible, though this involves the illogical practice of giving the epithet sometimes from the flower, (*violaceum*, *cruciforme*), and sometimes from the seed vessel, (*elatum*, *echinosum*, *corniculatum*). Guarding this distinction, however, we may perhaps be content to call the six last of the group, in English, Urchin Poppy, Violet Poppy, Crosslet Poppy, Horned Poppy, Beach Poppy, and Welcome Poppy. I don't think the last flower pretty enough to be connected more directly with the swallow, in its English name.

11. I shall be well content if my pupils know these ten poppies rightly ; all of them at present wild in our own country, and, I believe, also European in range : the head and type of all being the common wild poppy of our corn-fields for which the name '*Papaver Rhoeas*,' given it by Dioscorides, Gerarde, and Linnæus, is entirely authoritative, and we will therefore at once examine the meaning, and reason, of that name.

12. Dioscorides says the name belongs to it "*διὰ τὸ ταχέως τὸ αἶθος ἀποβάλλειν*," "because it casts off its bloom

quickly," from *ῥέω*, (rheo) in the sense of shedding.* And this indeed it does,—first calyx, then corolla;—you may translate it ‘swiftly ruinous’ poppy, but notice, in connection with this idea, how it droops its head *before* blooming; an action which, I donbt not, mingled in Homer’s thought with the image of its depression when filled by rain, in the passage of the Iliad, which, as I have relieved your memory of three unnecessary names of poppy families, you have memory to spare for learning.

“*μήκων δ’ ὡς ἐτέρωσε κάρη βάλεν, ἦτ’ ἐνὶ κήπῳ
καρπῷ βριθομένη, νοτίῃσι τε εἰάρινῃσιν
ὡς ἐτέρωσ’ ἤμυσσε κάρη πῆλῃκι βαρυνθέν.*”

“And as a poppy lets its head fall aside, which in a garden is loaded with its fruit, and with the soft rains of spring, so the youth drooped his head on one side; burdened with the helmet.”

And now you shall compare the translations of this passage, with its context, by Chapman and Pope—(or the school of Pope), the one being by a man of pure English temper, and able therefore to understand pure Greek temper; the other infected with all the faults of the falsely classical school of the Renaissance.

First I take Chapman:—

“His shaft smit fair Gorgythion, of Priam’s princely race
Who in Æpina was brought forth, a famous town in Thrace,

* It is also used sometimes of the garden poppy, says Dioscorides,
“*διὰ τὸ ῥεῖν ἐξ αὐτῆς τὸν ὀπὸν*”—“because the sap, opium, flows from it.”

By Castianeira, that for form was like celestial breed.
 And as a crimson poppy-flower, surcharged with his seed,
 And vernal humours falling thick, declines his heavy brow,
 So, a-oneside, his helmet's weight his fainting head did how.'

Next, Pope:—

" He missed the mark; but pierced Gorgythio's heart,
 And drenched in royal blood the thirsty dart:
 (Fair Castianeira, nymph of form divine,
 This offspring added to King Priam's line).
 As full-blown poppies, overcharged with rain,
 Decline the head, and drooping kiss the plain,
 So sinks the youth: his beauteous head, depressed
 Beneath his helmet, drops upon his breast."

13. I give you the two passages in full, trusting that you may so feel the becomingness of the one, and the gracelessness of the other. But note farther, in the Homeric passage, one subtlety which cannot enough be marked even in Chapman's English, that his second word, *ἤμυσε*, is employed by him both of the stooping of ears of corn, under wind, and of Troy stooping to its ruin; * and otherwise, in good Greek writers, the word is marked as having such specific sense of men's drooping under weight; or towards death, under the burden of fortune which they have no more strength to sustain; † compare the passage

* See all the passages quoted by Liddell.

† I find this chapter rather tiresome on re-reading it myself, and cancel some farther criticism of the imitation of this passage by Virgil, one of the few pieces of the *Æneid* which are purely and vulgarly imitative,

I quoted from Plato, ('Crown of Wild Olive,' p. 95):
 "And bore lightly the burden of gold and of possessions."

rendered also false as well as weak by the introducing sentence, "Volvitur Euryalus leto," after which the simile of the drooping flower is absurd. Of criticism, the chief use of which is to warn all sensible men from such business, the following abstract of Diderot's notes on the passage, given in the 'Saturday Review' for April 29th, 1871, is worth preserving. (Was the French critic really not aware that Homer *had* written the lines his own way?)

"Diderot illustrates his theory of poetical hieroglyphs by no quotations, but we can show the manner of his minute and sometimes fanciful criticism by repeating his analysis of the passage of Virgil wherein the death of Euryalus is described :—

' Pulchrosque per artus

It cruor, inque humeros cervix collapsa recumbit ;

Purpureus veluti cum flos succisus aratro

Languescit moriens ; lassove papavera collo

Demisere caput, pluvia cum forte gravantur.'

"The sound of 'It cruor,' according to Diderot, suggests the image of a jet of blood ; 'cervix collapsa recumbit,' the fall of a dying man's head upon his shoulder ; 'succisus' imitates the use of a cutting scythe (not plough) ; 'demisere' is as soft as the eye of a flower ; 'gravantur,' on the other hand, has all the weight of a calyx, filled with rain ; 'collapsa' marks an effort and a fall, and similar double duty is performed by 'papavera,' the first two syllables symbolizing the poppy upright, the last two the poppy bent. While thus pursuing his minute investigations, Diderot can scarcely help laughing at himself, and candidly owns that he is open to the suspicion of discovering in the poem beauties which have no existence. He therefore qualifies his eulogy by pointing out two faults in the passage. 'Gravantur,' notwithstanding the praise it has received, is a little too heavy for the light

And thus you will begin to understand how the poppy became in the heathen mind the type at once of power, or pride, and of its loss; and therefore, both why Virgil represents the white nymph Nais, "*pallentes violas, et summa papavera carpens*,"—gathering the pale flags, and the highest poppies,—and the reason for the choice of this rather than any other flower, in the story of Tarquin's message to his son.

14. But you are next to remember the word *Rhoeas* in another sense. Whether originally intended or afterwards caught at, the resemblance of the word to '*Rhoea*,' a pomegranate, mentally connects itself with the resemblance of the poppy head to the pomegranate fruit.

And if I allow this flower to be the first we take up for careful study in *Proserpina*, on account of its simplicity of form and splendour of colour, I wish you also to remember, in connection with it, the cause of Proserpine's eternal captivity — her having tasted a pomegranate seed,—the pomegranate being in Greek mythology what the apple is in the Mosaic legend; and, in the whole

head of a poppy, even when filled with water. As for '*aratro*,' coming as it does after the hiss of '*succisus*,' it is altogether abominable. Had Homer written the lines, he would have ended with some hieroglyph, which would have continued the hiss or described the fall of a flower. To the hiss of '*succisus*' Diderot is warmly attached. Not by mistake, but in order to justify the sound, he ventures to translate '*aratrum*' into '*scythe*,' boldly and rightly declaring in a marginal note that this is not the meaning of the word."

worship of Demeter, associated with the poppy by a multitude of ideas which are not definitely expressed, but can only be gathered out of Greek art and literature, as we learn their symbolism. The chief character on which these thoughts are founded is the fulness of seed in the poppy and pomegranate, as an image of life: then the forms of both became adopted for beads or bosses in ornamental art; the pomegranate remains more distinctly a Jewish and Christian type, from its use in the border of Aaron's robe, down to the fruit in the hand of Angelico's and Botticelli's Infant Christs; while the poppy is gradually confused by the Byzantine Greeks with grapes; and both of these with palm fruit. The palm, in the shorthand of their art, gradually becomes a symmetrical branched ornament with two pendent bosses; this is again confused with the Greek iris, (Homer's blue iris, and Pindar's water-flag,)—and the Florentines, in adopting Byzantine ornament, read it into their own *Fleur-de-lys*; but insert two poppyheads on each side of the entire foil, in their finest heraldry.

15. Meantime the definitely intended poppy, in late Christian Greek art of the twelfth century, modifies the form of the *Acanthus* leaf with its own, until the northern twelfth century workman takes the thistle-head for the poppy, and the thistle-leaf for *acanthus*. The true poppy-head remains in the south, but gets more and more confused with grapes, till the Renaissance carvers are content with any kind of boss full of seed, but insist on such boss

or bursting globe as some essential part of their ornament; —the bean-pod for the same reason (not without Pythagorean notions, and some of republican election) is used by Brnnelleschi for main decoration of the lantern of Florence duomo; and, finally, the ornamentation gets so shapeless, that M. Violet-le-Duc, in his ‘Dictionary of Ornament,’ loses trace of its origin altogether, and fancies the later forms were derived from the spadix of the arum.

16. I have no time to enter into farther details; but through all this vast range of art, note this singular fact, that the wheat-ear, the vine, the fleur-de-lys, the poppy, and the jagged leaf of the acanthus-weed, or thistle, occupy the entire thoughts of the decorative workmen trained in classic schools, to the exclusion of the rose, true lily, and the other flowers of luxury. And that the deeply underlying reason of this is in the relation of weeds to corn, or of the adverse powers of nature to the beneficent ones, expressed for us readers of the Jewish scriptures, centrally in the verse, “thorns also, and thistles, shall it bring forth to thee; and thou shalt eat the herb of the field” (*χαρτος*, grass or corn), and exquisitely symbolized throughout the fields of Enrope by the presence of the purple ‘corn-flag,’ or gladiolus, and ‘corn-rose’ (Gerarde’s name for *Papaver Rhoeas*), in the midst of carelessly tended corn; and in the traditions of the art of Enrope by the springing of the acanthus round the basket of the canephora, strictly the basket *for bread*, the idea of bread



including all sacred things carried at the feasts of Demeter, Bacchus, and the Queen of the Air. And this springing of the thorny weeds round the basket of reed, distinctly taken up by the Byzantine Italians in the basket-work capital of the twelfth century, (which I have already illustrated at length in the 'Stones of Venice,') becomes the germ of all capitals whatsoever, in the great schools of Gothic, to the end of Gothic time, and also of all the capitals of the pure and noble Renaissance architecture of Angelico and Perugino, and all that was learned from them in the north, while the introduction of the rose, as a primal element of decoration, only takes place when the luxury of English decorated Gothic, the result of that licentious spirit in the lords which brought on the Wars of the Roses, indicates the approach of destruction to the feudal, artistic, and moral power of the northern nations.

For which reason, and many others, I must yet delay the following out of our main subject, till I have answered the other question, which brought me to pause in the middle of this chapter, namely, 'What is a weed?'

CHAPTER VI.

THE PARABLE OF JOASH.

1. SOME ten or twelve years ago, I bought—three times twelve are thirty-six—of a delightful little book by Mrs. Gatty, called ‘Aunt Judy’s Tales’—whereof to make presents to my little lady friends. I had, at that happy time, perhaps from four-and-twenty to six-and-thirty—I forget exactly how many—very particular little lady friends; and greatly wished Aunt Judy to be the thirty-seventh,—the kindest, wittiest, prettiest girl one had ever read of, at least in so entirely proper and orthodox literature.

2. Not but that it is a suspicious sign of infirmity of faith in our modern moralists to make their exemplary young people always pretty; and dress them always in the height of the fashion. One may read Miss Edgeworth’s ‘Harry and Lucy,’ ‘Frank and Mary,’ ‘Fashionable Tales,’ or ‘Parents’ Assistant,’ through, from end to end, with extreimest care; and never find out whether Lucy was tall or short, nor whether Mary was dark or fair, nor how Miss Annaly was dressed, nor—which was my own chief point of interest—what was the colour of

Rosamond's eyes. Whereas Aunt Judy, in charming position after position, is shown to have expressed all her pure evangelical principles with the prettiest of lips; and to have had her gown, though puritanically plain, made by one of the best modistes in London.

3. Nevertheless, the book is wholesome and useful; and the nicest story in it, as far as I recollect, is an inquiry into the subject which is our present business, 'What is a weed?'—in which, by many pleasant devices, Aunt Judy leads her little brothers and sisters to discern that a weed is 'a plant in the wrong place.'

'Vegetable' in the wrong place, by the way, I think Aunt Judy says, being a precisely scientific little aunt. But I can't keep it out of my own less scientific head that 'vegetable' means only something going to be boiled. I like 'plant' better for general sense, besides that it's shorter.

Whatever we call them, Aunt Judy is perfectly right about them as far as she has gone; but, as happens often even to the best of evangelical instructresses, she has stopped just short of the gist of the whole matter. It is entirely true that a weed is a plant that has got into a wrong place; but it never seems to have occurred to Aunt Judy that some plants never *do*!

Who ever saw a wood anemone or a heath blossom in the wrong place? Who ever saw nettle or hemlock in a right one? And yet, the difference between flower and weed, (I use, for convenience sake, these words in their

familiar opposition,) certainly does not consist merely in the flowers being innocent, and the weed stinging and venomous. We do not call the nightshade a weed in our hedges, nor the scarlet agaric in our woods. But we do the corncockle in our fields.

4. Had the thoughtful little tutoress gone but one thought farther, and instead of “a vegetable in a wrong place,” (which it may happen to the innocentest vegetable sometimes to be, without turning into a weed, therefore,) said, “A vegetable which has an innate disposition to *get* into the wrong place,” she would have greatly furthered the matter for us; but then she perhaps would have felt herself to be uncharitably dividing with vegetables her own little evangelical property of original sin.

5. This, you will find, nevertheless, to be the very essence of weed character—in plants, as in men. If you glance through your botanical books, you will see often added certain names—‘a troublesome weed.’ It is not its being venomous, or ugly, but its being impertinent—thrusting itself where it has no business, and hinders other people’s business—that makes a weed of it. The most accursed of all vegetables, the one that has destroyed for the present even the possibility of European civilization, is only called a weed in the slang of its votaries; * but in the finest and truest English we call so the plant which

* And I have too harshly called our English vines, ‘wicked weeds of Kent,’ in *Fors Clavigera*, xxvii, 11. Much may be said for Ale, when we brew it for our people honestly.

has come to us by chance from the same country, the type of mere senseless prolific activity, the American water-plant, choking our streams till the very fish that leap out of them cannot fall back, but die on the clogged surface ; and indeed, for this unrestrainable, unconquerable insolence of uselessness, what name can be enough dishonourable ?

6. I pass to vegetation of nobler rank.

You remember, I was obliged in the last chapter to leave my poppy, for the present, without an English specific name, because I don't like Gerarde's 'Corn-rose,' and can't yet think of another. Nevertheless, I would have used Gerarde's name, if the corn-rose were as much a rose as the corn-flag is a flag. But it isn't. The rose and lily have quite different relations to the corn. The lily is grass in loveliness, as the corn is grass in use ; and both grow together in peace—gladiolus in the wheat, and narcissus in the pasture. But the rose is of another and higher order than the corn, and you never saw a cornfield overrun with sweetbriar or apple-blossom.

They have no mind, they, to get into the wrong place.

What is it, then, this temper in some plants—malicious as it seems—intrusive, at all events, or erring,—which brings them out of their places—thrusts them where they thwart us and offend ?

7. Primarily, it is mere hardihood and coarseness of make. A plant that can live anywhere, will often live where it is not wanted. But the delicate and tender ones

keep at home. You have no trouble in 'keeping down' the spring gentian. It rejoices in its own Alpine home, and makes the earth as like heaven as it can, but yields as softly as the air, if you want it to give place. Here in England, it will only grow on the loneliest moors, above the high force of Tees; its Latin name, for *us* (I may as well tell you at once) is to be '*Lucia verna*;' and its English one, Lucy of Teesdale.

8. But a plant may be hardy, and coarse of make, and able to live anywhere, and yet be no weed. The colts-foot, so far as I know, is the first of large-leaved plants to grow afresh on ground that has been disturbed: fall of Alpine débris, ruin of railroad embankment, waste of drifted slime by flood, it seeks to heal and redeem; but it does not offend us in our gardens, nor impoverish us in our fields.

Nevertheless, mere coarseness of structure, indiscriminate hardihood, is at least a point of some unworthiness in a plant. That it should have no choice of home, no love of native land, is ungentle; much more if such discrimination as it has, be immodest, and incline it, seemingly, to open and much-traversed places, where it may be continually seen of strangers. The tormentilla gleams in showers along the mountain turf; her delicate crosslets are separate, though constellate, as the rubied daisy. But the king-cup—(blessing be upon it always no less)—crowds itself sometimes into too burnished flame of inevitable gold. I don't know if there was anything in the

darkness of this last spring to make it brighter in resistance ; but I never saw any spaces of full warm yellow, in natural colour, so intense as the meadows between Reading and the Thames ; nor did I know perfectly what purple and gold meant, till I saw a field of park land embroidered a foot deep with king-cup and clover—while I was correcting my last notes on the spring colours of the Royal Academy—at Aylesbury.

9. And there are two other questions of extreme subtlety connected with this main one. What shall we say of the plants whose entire destiny is parasitic—which are not only sometimes, and *impertinently*, but always, and pertinently, out of place ; not only out of the right place, but out of any place of their own ? When is mistletoe, for instance, in the right place, young ladies, think you ? On an apple tree, or on a ceiling ? When is ivy in the right place ?—when wallflower ? The ivy has been torn down from the towers of Kenilworth ; the weeds from the arches of the Coliseum, and from the steps of the Araceli, irreverently, vilely, and in vain ; but how are we to separate the creatures whose office it is to abate the grief of ruin by their gentleness,

“ wafting wallflower scents

From out the crumbling ruins of fallen pride,
And chambers of transgression, now forlorn,”

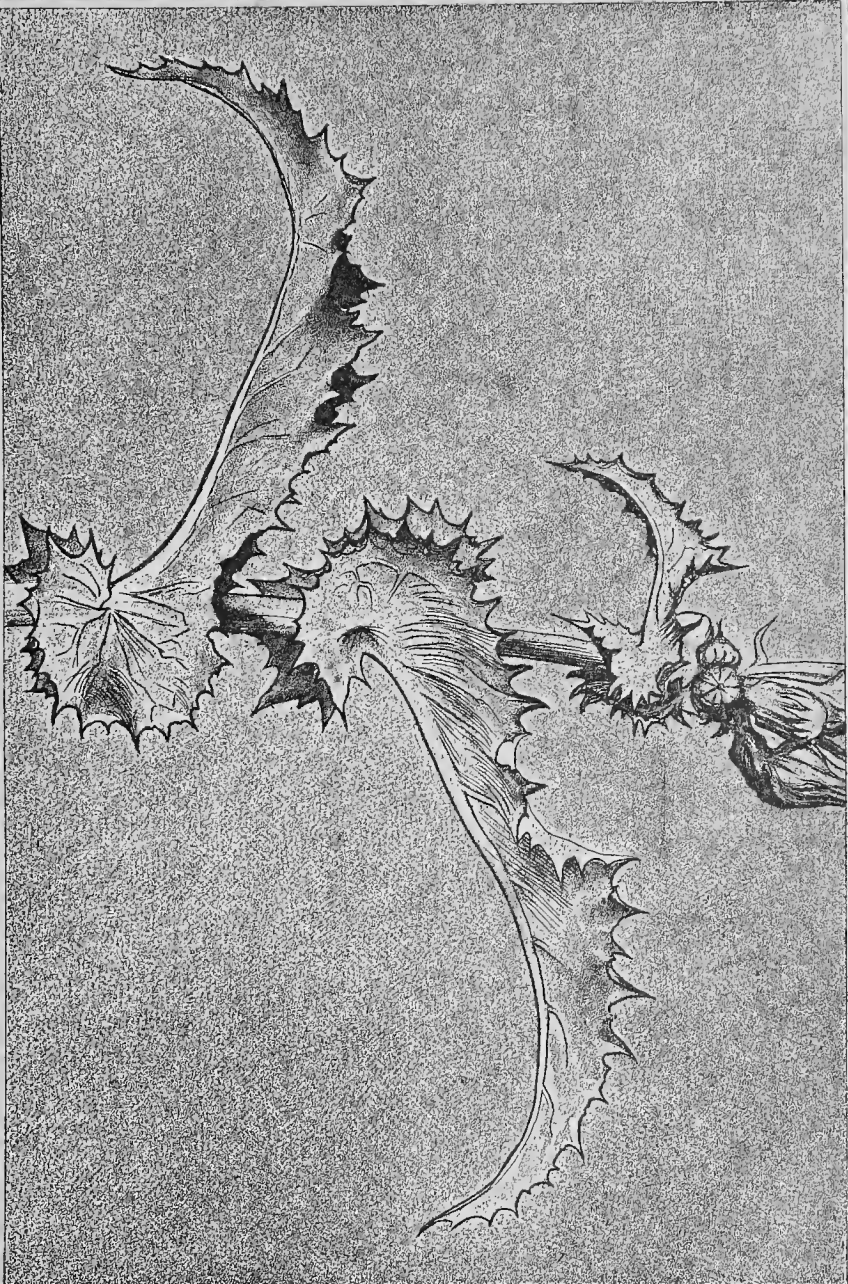
from those which truly resist the toil of men, and conspire against their fame ; which are cunning to consume, and

Love is, and those unclasped, that toss with tangle and with shells.

* * * * *

13. I had a long bit in my head, that I wanted to write, about St. George of the Seaweed, but I've no time to do it; and those few words of Tennyson's are enough, if one thinks of them: only I see, in correcting press, that I've partly misapplied the idea of 'gathering' in the leaf edge. It would be more accurate to say it was gathered at the central rib; but there is nothing in needlework that will represent the actual excess by lateral growth at the edge, giving three or four inches of edge for one of centre. But the stiffening of the fold by the thorn which holds it out is very like the action of a ship's spars on its sails; and absolutely in many cases like that of the spines in a fish's fin, passing into the various conditions of serpentine and dracontic crest, connected with all the terrors and adversities of nature; not to be dealt with in a chapter on weeds.

14. Here is a sketch of a crested leaf of less adverse temper, which may as well be given, together with Plate III., in this number, these two engravings being meant for examples of two different methods of drawing, both useful according to character of subject. Plate III. is sketched first with a finely-pointed pen, and common ink, on white paper; then washed rapidly with colour, and retouched with the pen to give sharpness and completion.



IV.

Crested leaves. .

This method is used because the thistle leaves are full of complex and sharp sinuosities, and set with intensely sharp spines passing into hairs, which require many kinds of execution with the fine point to imitate at all. In the drawing there was more look of the bloom or woolliness on the stems, but it was useless to try for this in the mezzotint, and I desired Mr. Allen to leave his work at the stage where it expressed as much form as I wanted. The leaves are of the common marsh thistle, of which more anon; and the two long lateral ones are only two different views of the same leaf, while the central figure is a young leaf just opening. It beat me, in its delicate bossing, and I had to leave it, discontentedly enough.

Plate IV. is much better work, being of an easier subject, adequately enough rendered by perfectly simple means. Here I had only a succulent and membranous surface to represent, with definite outlines, and merely undulating folds; and this is sufficiently done by a careful and firm pen outline on grey paper, with a slight wash of colour afterwards, reinforced in the darks; then marking the lights with white. This method is classic and authoritative, being used by many of the greatest masters, (by Holbein continually;) and it is much the best which the general student can adopt for expression of the action and muscular power of plants.

The goodness or badness of such work depends absolutely on the truth of the single line. You will find a thousand botanical drawings which will give you a deli-

cate and deceptive resemblance of the leaf, for one that will give you the right convexity in its backbone, the right perspective of its peaks when they foreshorten, or the right relation of depth in the shading of its dimples. On which, in leaves as in faces, no little expression of temper depends.

Meantime we have yet to consider somewhat more touching that temper itself, in next chapter.



CHAPTER VII.

THE PARABLE OF JOTHAM.

1. I do not know if my readers were checked, as I wished them to be, at least for a moment, in the close of the last chapter, by my talking of thistles and dandelions changing into seaweed, by gradation of which, doubtless, Mr. Darwin can furnish us with specious and sufficient instances. But the two groups will not be contemplated in our Oxford system as in any parental relations whatsoever.

We shall, however, find some very notable relations existing between the two groups of the wild flowers of dry land, which represent, in the widest extent, and the distinctest opposition, the two characters of material serviceableness and unserviceableness; the groups which in our English classification will be easily remembered as those of the Thyme, and the Daisy.

The one, scented as with incense—medicinal—and in all gentle and humble ways, useful. The other, scentless—helpless for ministry to the body; infinitely dear as the bringer of light, ruby, white and gold; the three colours of the Day, with no hue of shade in it. Therefore I

take it on the coins of St. George for the symbol of the splendour or light of heaven, which is dearest where humblest.

2. Now these great two orders—of which the types are the thyme and the daisy—you are to remember generally as the ‘Herbs’ and the ‘Sunflowers.’ You are not to call them Lipped flowers, nor Composed flowers; because the first is a vulgar term; for when you once come to be able to draw a lip, or, in noble duty, to kiss one, you will know that no other flower in earth is like that: and the second is an indefinite term; for a foxglove is as much a ‘composed’ flower as a daisy; but it is composed in the shape of a spire, instead of the shape of the sun. And again a thistle, which common botany calls a composed flower, as well as a daisy, is composed in quite another shape, being on the whole, bossy instead of flat; and of another temper, or composition of mind, also, being connected in that respect with butterburs, and a vast company of rough, knotty, half-black or brown, and generally unluminous—flowers I can scarcely call them—and weeds I will not,—creatures, at all events, in nowise to be gathered under the general name ‘Composed,’ with the stars that crown Chancer’s Alcestis, when she returns to the day from the dead.

But the wilder and stronger blossoms of the Hawk’s-eye—again you see I refuse for them the word weed;—and the waste-loving Chicory, which the Venetians call ‘*Sponsa solis*,’ are all to be held in one class with the

Sunflowers; but dedicate,—the daisy to Alcestis alone; others to Clytia, or the Physician Apollo himself: but I can't follow their mythology yet awhile.

3. Now in these two families you have typically Use opposed to Beauty in *wildness*; it is their wildness which is their virtue;—that the thyme is sweet where it is unthought of, and the daisies red, where the foot despises them: while, in other orders, wildness is their crime,—“Wherefore, when I looked that it should bring forth grapes, brought it forth wild grapes?” But in all of them you must distinguish between the pure wildness of flowers and their distress. It may not be our duty to tame them; but it must be, to relieve.

4. It chanced, as I was arranging the course of these two chapters, that I had examples given me of distressed and happy wildness, in immediate contrast. The first, I grieve to say, was in a bit of my own brushwood, left uncared-for evidently many a year before it became mine. I had to cut my way into it through a mass of thorny ruin; black, birds-nest like, entanglement of brittle spray round twisted stems of ill-grown birches strangling each other, and changing half into roots among the rock clefts; knotted stumps of never-blossoming blackthorn, and choked stragglings of holly, all laced and twisted and tethered round with an untouchable, almost unhewable, thatch, a foot thick, of dead bramble and rose, laid over rotten ground through which the water soaked ceaselessly, undermining it into merely unctuous

clods and clots, knitted together by mossy sponge. It was all Nature's free doing! she had had her way with it to the uttermost; and clearly needed human help and interference in her business; and yet there was not one plant in the whole ruinous and deathful riot of the place, whose nature was not in itself wholesome and lovely; but all lost for want of discipline.

5. The other piece of wild growth was among the fallen blocks of limestone under Malham Cove. Sheltered by the cliff above from stress of wind, the ash and hazel wood spring there in a fair and perfect freedom, without a diseased bough, or an unwholesome shade. I do not know why mine is all encumbered with overgrowth, and this so lovely that scarce a branch could be gathered but with injury;—while underneath, the oxalis, and the two smallest geraniums (*Lucidum* and *Herb-Robert*) and the mossy saxifrage, and the cross-leaved bed-straw, and the white pansy, wrought themselves into wreaths among the fallen crags, in which every leaf rejoiced, and was at rest.

6. Now between these two states of equally natural growth, the point of difference that forced itself on me (and practically enough, in the work I had in my own wood), was not so much the withering and waste of the one, and the life of the other, as the thorniness and cruelty of the one, and the softness of the other. In Malham Cove, the stones of the brook were softer with moss than any silken pillow—the crowded oxalis leaves yielded to the pressure of the hand, and were not felt—the cloven

leaves of the Herb-Robert and orbed clusters of its companion overflowed every rent in the rude crags with living balm; there was scarcely a place left by the tenderness of the happy things, where one might not lay down one's forehead on their warm softness, and sleep. But in the waste and distressed ground, the distress had changed itself to cruelty. The leaves had all perished, and the bending saplings, and the wood of trust;—but the thorns were there, immortal, and the gnarled and sapless roots, and the dusty treacheries of decay.

7. Of which things you will find it good to consider also otherwise than botanically. For all these lower organisms suffer and perish, or are gladdened and flourish, under conditions which are in utter precision symbolical, and in utter fidelity representative, of the conditions which induce adversity and prosperity in the kingdoms of men: and the Eternal Demeter,—Mother, and Judge,—brings forth, as the herb yielding seed, so also the thorn and the thistle, not to herself, but *to thee*.

8. You have read the words of the great Law often enough;—have you ever thought enough of them to know the difference between these two appointed means of Distress? The first, the Thorn, is the type of distress *caused by crime*, changing the soft and breathing leaf into inflexible and wounding stubbornness. The second is the distress appointed to be the means and herald of good,—Thou shalt see the stubborn thistle bursting, into glossy purple, which outredden, all voluptuous garden roses.

9. It is strange that, after much hunting, I cannot find authentic note of the day when Scotland took the thistle for her emblem; and I have no space (in this chapter at least) for tradition; but, with whatever lightness of construing we may receive the symbol, it is actually the truest that could have been found, for some conditions of the Scottish mind. There is no flower which the Proserpina of our Northern Sicily cherishes more dearly: and scarcely any of us recognize enough the beautiful power of its close-set stars, and rooted radiance of ground leaves; yet the stubbornness and ungraceful rectitude of its stem, and the besetting of its wholesome substance with that fringe of offence, and the forwardness of it, and dominance,—I fear to lacerate some of my dearest friends if I went on:—let them rather, with Bailie Jarvie's true conscience,* take their Scott from the inner shelf in their heart's library which all true Scotsmen give him, and trace, with the swift reading of memory, the characters of Fergus M'Ivor, Hector M'Intyre, Manse Headrigg, Alison Wilson, Richie

* Has my reader ever thought,—I never did till this moment,—how it perfects the exquisite character which Scott himself loved, as he invented, till he changed the form of the novel, that his habitual interjection should be this word;—not but that the oath, by conscience, was happily still remaining then in Scotland, taking the place of the mediæval 'by St. Andrew,' we in England, long before the Scot, having lost all sense of the Puritanical appeal to private conscience, as of the Catholic oath, 'by St. George;' and our uncanonized 'by George' in sonorous rudeness, ratifying, not now our common conscience, but our individual opinion.

Moniplies, and Andrew Fairservice ; and then say, if the faults of all these, drawn as they are with a precision of touch like a Corinthian sculptor's of the acanthus leaf, can be found in anything like the same strength in other races, or if so stubbornly folded and starched moni-plies of irritating kindness, selfish friendliness, lowly conceit, and intolerable fidelity, are native to any other spot of the wild earth of the habitable globe.

10. Will you note also—for this is of extreme interest—that these essential faults are all mean faults ;—what we may call ground-growing faults ; conditions of semi-education, of hardly-treated homelife, or of coarsely-minded and wandering prosperity. How literally may we go back from the living soul symbolized, to the strangely accurate earthly symbol, in the prickly weed. For if, with its bravery of endurance, and carelessness in choice of home, we find also definite faculty and habit of migration, volant mechanism for choiceless journey, not divinely directed in pilgrimage to known shrines ; but carried at the wind's will by a Spirit which listeth *not*—it will go hard but that the plant shall become, if not dreaded, at least despised ; and, in its wandering and reckless splendour, disgrace the garden of the sluggard, and possess the inheritance of the prodigal : until even its own nature seems contrary to good, and the invocation of the just man be made to it as the executor of Judgment, “ Let thistles grow instead of wheat, and cockle instead of barley.”

11. Yet to be despised—either for men or flowers—may

be no ill-fortune ; the real ill-fortune is only to be despicable. These faults of human character, wherever found, observe, belong to it as ill-trained—incomplete ; confirm themselves only in the vulgar. There is no base pertinacity, no overweening conceit, in the Black Douglas, or Claverhouse, or Montrose ; in these we find the pure Scottish temper, of heroic endurance and royal pride ; but, when, in the pay, and not deceived, but purchased, idolatry of Mammon, the Scottish persistence and pride become knit and vested in the spleuchan, and your stiff Covenanter makes his covenant with Death, and your Old Mortality deciphers only the senseless legends of the eternal gravestone,—you get your weed, earth grown, in bitter verity, and earth-devastating, in bitter strength.

12. I have told you, elsewhere, we are always first to study national character in the highest and purest examples. But if our knowledge is to be complete, we have to study also the special diseases of national character. And in exact opposition to the most solemn virtue of Scotland, the domestic truth and tenderness breathed in all Scottish song, you have this special disease and mortal cancer, this woody-fibriness, literally, of temper and thought : the consummation of which into pure lignite, or rather black Devil's charcoal—the sap of the birks of Aberfeldy become cinder, and the blessed juices of them, deadly gas,—you may know in its pure blackness best in the work of the greatest of these ground-growing Scotchmen, Adam Smith.

13. No man of like capacity, I believe, born of any other nation, could have deliberately, and with no momentary shadow of suspicion or question, formalized the spinous and monstrous fallacy that human commerce and policy are *naturally* founded on the desire of every man to possess his neighbour's goods.

This is the 'release unto us Barabbas,' with a witness; and the deliberate systematization of that cry, and choice, for perpetual repetition and fulfilment in Christian statesmanship, has been, with the strange precision of natural symbolism and retribution, signed, (as of old, by strewing of ashes on Kidron,) by strewing of ashes on the brooks of Scotland; waters once of life, health, music, and divine tradition; but to whose festering scum you may now set fire with a candle; and of which, round the once-excelling palace of Scotland, modern sanitary science is now helplessly contending with the poisonous exhalations.

14. I gave this chapter its heading, because I had it in my mind to work out the meaning of the fable in the ninth chapter of Judges, from what I had seen on that thorny ground of mine, where the bramble was king over all the trees of the wood. But the thoughts are gone from me now; and as I re-read the chapter of Judges,—now, except in my memory, unread, as it chances, for many a year,—the sadness of that story of Gideon fastens on me, and silences me. *This* the end of his angel visions, and dream-led victories, the slaughter of all his

sons but this youngest,*—and he never again heard of in Israel!

You Scottish children of the Rock, taught through all your once pastoral and noble lives by many a sweet miracle of dew on fleece and ground,—once servants of mighty kings, and keepers of sacred covenant; have you indeed dealt truly with your warrior kings, and prophet saints, or are these ruins of their homes, and shrines, dark with the fire that fell from the curse of Jerubbael?

* 'Jotham,' 'Sum perfectio eorum,' or 'Consummatio eorum.' (Interpretation of name in Vulgate index.)

CHAPTER VIII.

THE STEM.

1. As I read over again, with a fresh mind, the last chapter, I am struck by the opposition of states which seem best to fit a weed for a weed's work,—stubbornness, namely, and flaccidity. On the one hand, a sternness and a coarseness of structure which changes its stem into a stake, and its leaf into a spine; on the other, an utter flaccidity and ventosity of structure, which changes its stem into a riband, and its leaf into a bubble. And before we go farther—for we are not yet at the end of our study of these obnoxious things—we had better complete an examination of the parts of a plant in general, by ascertaining what a Stem proper is; and what makes it stiffer, or hollower, than we like it;—how, to wit, the gracious and generous strength of ash differs from the spinous obstinacy of blackthorn,—and how the geometric and enduring hollowness of a stalk of wheat differs from the soft fulness of that of a mushroom. To which end, I will take up a piece of stndy, not of black, but white, thorn, written last spring.

2. I suppose there is no question but that all nice people like hawthorn blossom.

I want, if I can, to find out to-day, 25th May, 1875, what it is we like it so much for: holding these two branches of it in my hand—one full out, the other in youth. This full one is a mere mass of symmetrically balanced—snow, one was going vaguely to write, in the first impulse. But it is nothing of the sort. White,—yes, in a high degree; and pure, totally; but not at all dazzling in the white, nor pure in an insultingly rivalless manner, as snow would be; yet pure somehow, certainly; and white, absolutely, in spite of what might be thought failure,—imperfection—nay, even distress and loss in it. For every little rose of it has a green darkness in the centre—not even a pretty green, but a faded, yellowish, glutinous, unaccomplished green; and round that, all over the surface of the blossom, whose shell-like petals are themselves deep sunk, with grey shadows in the hollows of them—all above this already subdued brightness, are strewn the dark points of the dead stamens—manifest more and more, the longer one looks, as a kind of grey sand, sprinkled without sparing over what looked at first unspotted light. And in all the ways of it the lovely thing is more like the spring frock of some prudent little maid of fourteen, than a flower;—frock with some little spotty pattern on it to keep it from showing an unintended and inadvertent spot,—if Fate should ever inflict such a thing! Undeveloped, thinks Mr. Darwin,—the poor

short-coming, ill-blanchèd thorn blossom—going to be a Rose, some day soon ; and, what next ?—who knows ?—perhaps a Pæony !

3. Then this next branch, in dawn and delight of youth, set with opening clusters of yet numerable blossom, four, and five, and seven, edged, and islanded, and ended, by the sharp leaves of freshest green, deepened under the flowers, and studded round with bosses, better than pearl beads of St. Agnes' rosary,—folded, over and over, with the edges of their little leaves pouting, as the very softest waves do on flat sand where one meets another ; then opening just enough to show the violet colour within—which yet isn't violet colour, nor even “*meno che le rose*,” but a different colour from every other lilac that one ever saw ;—faint and faded even before it sees light, as the filmy cup opens over the depth of it, then broken into purple motes of tired bloom, fading into darkness, as the cup extends into the perfect rose.

This, with all its sweet change that one would so fain stay, and soft effulgence of bud into softly falling flower, one has watched—how often ; but always with the feeling that the blossoms are thrown over the green depth like white clouds—never with any idea of so much as asking what holds the cloud there. Have each of the innumerable blossoms a separate stalk ? and, if so, how is it that one never thinks of the stalk, as one does with currants ?

4. Turn the side of the branch to you ;—Nature never meant you to see it so ; but now it is all stalk below, and

stamens above,—the petals nothing, the stalks all tiny trees, always dividing their branches mainly into three—one in the centre short, and the two lateral, long, with an intermediate extremely long one, if needed, to fill a gap, so contriving that the flowers shall all be nearly at the same level, or at least surface of ball, like a guelder rose. But the cunning with which the tree conceals its structure till the blossom is fallen, and then—for a little while, we had best look no more at it, for it is all like grape-stalks with no grapes.

These, whether carrying hawthorn blossom and haw, or grape blossom and grape, or peach blossom and peach, you will simply call the ‘stalk,’ whether of flower or fruit. A ‘stalk’ is essentially round, like a pillar; and has, for the most part, the power of first developing, and then shaking off, flower and fruit from its extremities. You can pull the peach from its stalk, the cherry, the grape. Always at some time of its existence, the flower-stalk lets fall something of what it sustained, petal or seed.

In late Latin it is called ‘petiolus,’ the little foot; because the expanding piece that holds the grape, or olive, is a little like an animal’s foot. Modern botanists have misapplied the word to the *leaf*-stalk, which has no resemblance to a foot at all. We must keep the word to its proper meaning, and, when we want to write Latin, call it ‘petiolus;’ when we want to write English, call it ‘stalk,’ meaning always fruit or flower stalk.

I cannot find when the word 'stalk' first appears in English :—its derivation will be given presently.

5. Gather next a hawthorn leaf. That also has a stalk ; but you can't shake the leaf off it. It, and the leaf, are essentially one ; for the sustaining fibre runs up into every ripple or jag of the leaf's edge : and its section is different from that of the flower-stalk ; it is no more round, but has an upper and under surface, quite different from each other. It will be better, however, to take a larger leaf to examine this structure in. Cabbage, cauliflower, or rhubarb, would any of them be good, but don't grow wild in the luxuriance I want. So, if you please, we will take a leaf of burdock, (*Aretium Lappa*,) the principal business of that plant being clearly to grow leaves wherewith to adorn fore-grounds.*

6. The outline of it in Sowerby is not an intelligent one, and I have not time to draw it but in the rudest way myself ; Fig. 13, *a* ; with perspectives of the elementary form below, *b*, *c*, and *d*. By help of which, if you will construct a burdock leaf in paper, my rude outline (*a*) may tell the rest of what I want you to see.

Take a sheet of stout note paper, Fig. 14, A, double it sharply down the centre, by the dotted line, then give it the two cuts at *a* and *b*, and double those pieces sharply back, as at B ; then, opening them again, cut the whole

* If you will look at the engraving, in the England and Wales series, of Turner's Oakhampton, you will see its use.

into the form C; and then, pulling up the corners *c d*, stitch them together with a loose thread so that the points *c* and *d* shall be within half an inch of each other; and

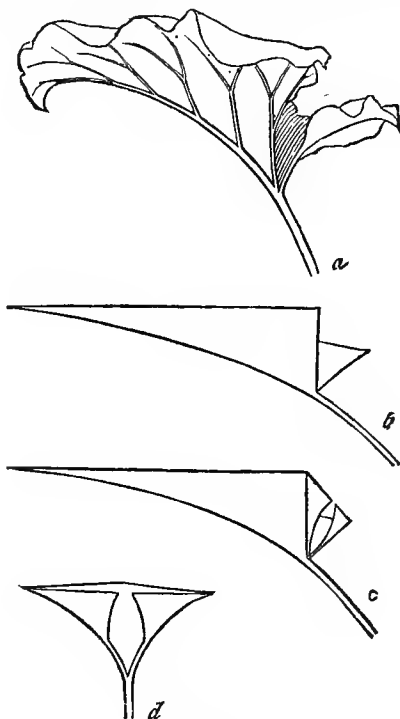


FIG. 13.

you will have a kind of triangular scoop, or shovel, with a stem, by which you can sufficiently hold it, D.

7. And from this easily constructed and tenable model, you may learn at once these following main facts about all leaves.

[I.] That they are not flat, but, however slightly, always hollowed into craters, or raised into hills, in one or another direction ; so that any drawable outline of them does not in the least represent the real extent of their surfaces ; and until you know how to draw a cup, or a mountain, rightly, you have no chance of drawing a leaf. My

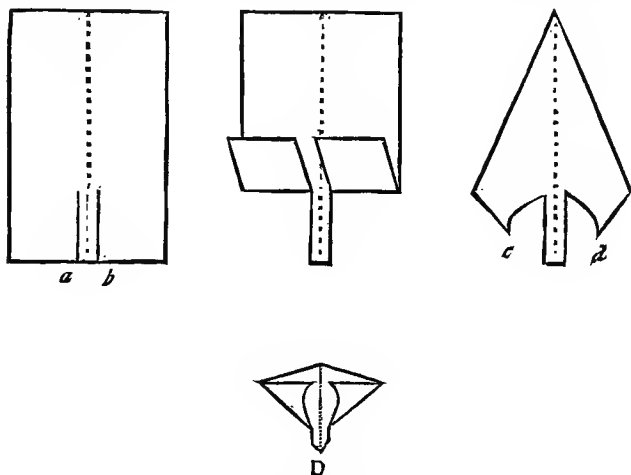


FIG. 14.

simple artist readers of long ago, when I told them to draw leaves, thought they could do them by the bough-full, whenever they liked. Alas, except by old William Hunt, and Burne Jones, I've not seen a leaf painted, since those burdocks of Turner's ; far less sculptured—though one would think at first that was easier ! Of which we shall have talk elsewhere ; here I must go on to note fact number two, concerning leaves.

8. [II.] The strength of their supporting stem consists not merely in the gathering together of all the fibres, but in gathering them essentially into the profile of the letter V, which you will see your doubled paper stem has ; and of which you can feel the strength and use, in your hand, as you hold it. Gather a common plantain leaf, and look at the way it puts its round ribs together at the base, and you will understand the matter at once. The arrangement is modified and disguised in every possible way, according to the leaf's need : in the aspen, the leaf-stalk becomes an absolute vertical plank ; and in the large trees is often almost rounded into the likeness of a fruit-stalk ; —but, in all,* the essential structure is this doubled one ; and in all, it opens at the place where the leaf joins the main stem, into a kind of cup, which holds next year's bud in the hollow of it.

9. Now there would be no inconvenience in your simply getting into the habit of calling the round petiol of the fruit the 'stalk,' and the contracted channel of the leaf, 'leaf-stalk.' But this way of naming them would not enforce, nor fasten in your mind, the difference between the two, so well as if you have an entirely different name for the leaf-stalk. Which is the more desirable, because the limiting character of the leaf, botanically, is—(I only learned this from my botanical friend the other day, just

* General assertions of this kind must always be accepted under indulgence,—exceptions being made afterwards.

in the very moment I wanted it,)—that it holds the bud of the new stem in its own hollow, but cannot itself grow in the hollow of anything else;—or, in botanical language, leaves are never axillary,—don't grow in armpits, but are themselves armpits; hollows, that is to say, where they spring from the main stem.

10. Now there is already a received and useful botanical word, 'cyme' (which we shall want in a little while,) derived from the Greek *κῦμα*, a swelling or rising wave, and used to express a swelling cluster of foamy blossom. Connected with that word, but in a sort the reverse of it, you have the Greek 'κύμβη,' the *hollow* of a cup, or bowl; whence *κύμβαλον*, a cymbal,—that is to say, a musical instrument owing its tone to its *hollowness*. These words become in Latin, *cymba*, and *cymbalum*; and I think you will find it entirely convenient and advantageous to call the leaf-stalk distinctively the 'cymba,' retaining the mingled idea of cup and boat, with respect at least to the part of it that holds the bud; and understanding that it gathers itself into a V-shaped, or even narrowly vertical, section, as a boat narrows to its bow, for strength to sustain the leaf.

With this word you may learn the Virgilian line, that shows the final use of iron—or iron-darkened—ships:

“Et ferrugineâ subvectat corpora cymbâ.”

The “subvectat corpora” will serve to remind you of the office of the leafy cymba in carrying the bud; and make

you thankful that the said leafy vase is not of iron ; and is a ship of Life instead of Death.

11. Already, not once, nor twice, I have had to use the word ‘stem,’ of the main round branch from which both stalk and cyma spring. This word you had better keep for all growing, or advancing, shoots of trees, whether from the ground, or from central trunks and branches. I regret that the words multiply on us ; but each that I permit myself to use has its own proper thought or idea to express, as you will presently perceive ; so that true knowledge multiplies with true words.

12. The ‘stem,’ you are to say, then, when you mean the *advancing* shoot,—which lengthens annually, while a stalk ends every year in a blossom, and a cyma in a leaf. A stem is essentially round,* square, or regularly polygonal ; though, as a cyma may become exceptionally round, a stem may become exceptionally flat, or even mimic the shape of a leaf. Indeed I should have liked to write “a stem is essentially round, and constructively, on occasion, square,”—but it would have been too grand. The fact is, however, that a stem is really a roundly minded thing, throwing off its branches in circles as a trundled mop throws off drops, though it can always order the branches to fly off in what order it likes,—two at a time, opposite to each other ; or three, or five, in a spiral coil ; or one here and one there, on this side and that ;

* I use ‘round’ rather than ‘cylindrical,’ for simplicity’s sake.

but it is always twisting, in its own inner mind and force ; hence it is especially proper to use the word ‘stem’ of it — *στέμμα*, a twined wreath ; properly, twined round a staff, or sceptre : therefore, learn at once by heart these lines in the opening Iliad :

“ *Στέμματ’ ἔχων ἐν χερσὶν ἐπηβόλου Ἀπόλλωνος,
Χρυσέφ’ ἀνὰ σκήπτρῳ*”

And recollect that a sceptre is properly a staff to lean upon ; and that as a crown or diadem is first a binding thing, a ‘sceptre’ is first a *supporting* thing, and it is in its nobleness, itself made of the stem of a young tree. You may just as well learn also this :

“ *Ναὶ μὰ τόδε σκήπτρον, τὸ μὲν οὐποτε φύλλα καὶ ὕδους
Φύσει, ἐπειδὴ πρῶτα τομὴν ἐν ὄρεσσι λέλοιπεν,
Οὐδ’ ἀναβλήσας περὶ γάρ ῥά ἐ χαλκὸς ἔλεψε
Φύλλα τε καὶ φλοιόν· νῦν αὖτε μιν νῖες Ἀχαιῶν
Ἐν παλάμῃς φορέουσι δικασπόλοι, οἳ τε θέμστας
Πρὸς Διὸς εἰρύαται*”

“ Now, by this sacred sceptre hear me swear
Which never more shall leaves or blossoms bear,
Which, severed from the trunk, (as I from thee,)
On the bare mountains left its parent tree ;
This sceptre, formed by tempered steel to prove
An ensign of the delegates of Jove,
From whom the power of laws and justice springs
(Tremendous oath, inviolate to Kings).”

13. The supporting power in the tree itself is, I doubt not, greatly increased by this spiral action ; and the fine

instinct of its being so, caused the twisted pillar to be used in the Lombardie Gothie,—at first, merely as a pleasant variety of form, but at last constructively and universally, by Giotto, and all the architects of his school. Not that the spiral form actually adds to the strength of a Lombardie pillar, by imitating contortions of wood, any more than the fluting of a Doric shaft adds to its strength by imitating the canaliculation of a reed; but the perfect action of the imagination, which had adopted the encircling acanthus for the capital, adopted the twining stemma for the shaft; the pure delight of the eye being the first condition in either case: and it is inconceivable how much of the pleasure taken both in ornament and in natural form is founded elementarily on groups of spiral line. The study in our fifth plate, of the involucre of the wastethistle,* is as good an example as I can give of the more subtle and concealed conditions of this structure.

14. Returning to our present business of nomenclature, we find the Greek word, ‘stemma,’ adopted by the Latins,

* *Carduus Arvensis*. ‘Creeping Thistle,’ in Sowerby; why, I cannot conceive, for there is no more creeping in it than in a furzebush. But it especially haunts foul and neglected ground; so I keep the Latin name, translating ‘Waste-Thistle.’ I could not show the variety of the curves of the involucre without enlarging; and if, on this much increased scale, I had tried to draw the flower, it would have taken Mr. Allen and me a good month’s more work. And I had no more a month than a life, to spare: so the action only of the spreading flower is indicated, but the involucre drawn with precision.

becoming the expression of a growing and hereditary race ; and the branched tree, the natural type, among all nations, of multiplied families. Hence the entire fitness of the word for our present purposes ; as signifying, “ a spiral shoot extending itself by branches.” But since, unless it is spiral, it is not a stem, and unless it has branches, it is not a stem, we shall still want another word for the sustaining ‘sceptre’ of a foxglove, or cowslip. Before determining that, however, we must see what need there may be of one familiar to our ears until lately, although now, I understand, falling into disuse.

15. By our definition, a stem is a spirally bent, essentially living and growing, shoot of vegetation. But the branch of a tree, in which many such stems have their origin, is not, except in a very subtle and partial way, spiral ; nor, except in the shoots that spring from it, progressive forwards ; it only receives increase of thickness at its sides. Much more, what used to be called the *trunk* of a tree, in which many branches are united, has ceased to be, except in mere tendency and temper, spiral ; and has so far ceased from growing as to be often in a state of decay in its interior, while the external layers are still in serviceable strength.

16. If, however, a trunk were only to be defined as an arrested stem, or a cluster of arrested stems, we might perhaps refuse, in scientific use, the popular word. But such a definition does not touch the main idea. Branches usually begin to assert themselves at a height above the

ground approximately fixed for each species of tree,—low in an oak, high in a stone pine ; but, in both, marked as a point of *structural change in the direction of growing force*, like the spring of a vault from a pillar ; and as the tree grows old, some of its branches getting torn away by winds or falling under the weight of their own fruit, or load of snow, or by natural decay, there remains literally a ‘truncated’ mass of timber, still bearing irregular branches here and there, but inevitably suggestive of resemblance to a human body, after the loss of some of its limbs.

And to prepare trees for their practical service, what age and storm only do partially, the first rough process of human art does completely. The branches are lopped away, leaving literally the ‘truncus’ as the part of the tree out of which log and rafter can be cut. And in many trees, it would appear to be the chief end of their being to produce this part of their body on a grand scale, and of noble substance ; so that, while in thinking of vegetable life without reference to its use to men or animals, we should rightly say that the essence of it was in leaf and flower—not in trunk or fruit ; yet for the sake of animals, we find that some plants, like the vine, are apparently meant chiefly to produce fruit ; others, like laurels, chiefly to produce leaves ; others chiefly to produce flowers ; and others to produce permanently serviceable and sculptural wood ; or, in some cases, merely picturesque and monumental masses of vegetable rock, “intertwisted

fibres serpentine,"—of far nobler and more pathetic use in their places, and their enduring age, than ever they could be for material purpose in human habitation. For this central mass of the vegetable organism, then, the English word 'trunk' and French 'tronc' are always in accurate scholarship to be retained—meaning the part of a tree which remains when its branches are lopped away.

17. We have now got distinct ideas of four different kinds of stem, and simple names for them in Latin and English,—Petiolus, Cymba, Stemma, and Truncus; Stalk, Leaf-stalk, Stem, and Trunk; and these are all that we shall commonly need. There is, however, one more that will be sometimes necessary, though it is ugly and difficult to pronounce, and must be as little used as we can.

And here I must ask you to learn with me a little piece of Roman history. I say, to *learn* with me, because I don't know any Roman history except the two first books of Livy, and little bits here and there of the following six or seven. I only just know enough about it to be able to make out the bearings and meaning of any fact that I now learn. The greater number of modern historians know, (if honest enough even for that,) the facts, or something that may possibly be like the facts, but haven't the least notion of the meaning of them. So that, though I have to find out everything that I want in Smith's dictionary, like any schoolboy, I can usually tell you the signifi-

cance of what I so find, better than perhaps even Mr. Smith himself could.

18. In the 586th page of Mr. Smith's volume, you have it written that 'Calvus,' bald-head, was the name of a family of the Licinia gens; that the man of whom we hear earliest, as so named, was the first plebeian elected to military tribuneship in B.C. 400; and that the fourth of whom we hear, was surnamed 'Stolo,' because he was so particular in pruning away the Stolons (stolones), or useless young shoots, of his vines.

We must keep this word 'stolon,' therefore, for these young suckers springing from an old root. Its derivation is uncertain; but the main idea meant by it is one of uselessness,—sprouting without occasion or fruit; and the words 'stolidus' and 'stolid' are really its derivatives, though we have lost their sense in English by partly confusing them with 'solid' which they have nothing to do with. A 'stolid' person is essentially a 'useless sucker' of society; frequently very leafy and graceful, but with no good in him.

19. Nevertheless, I won't allow our vegetable 'stolons' to be despised. Some of quite the most beautiful forms of leafage belong to them;—even the foliage of the olive itself is never seen to the same perfection on the upper branches as in the young ground-rods in which the dual groups of leaves crowd themselves in their haste into clusters of three.

But, for our point of Latin history, remember always

that in 400 B.C., just a year before the death of Socrates at Athens, this family of Stolid persons manifested themselves at Rome, shooting up from plebeian roots into places where they had no business ; and preparing the way for the degradation of the entire Roman race under the Empire ; their success being owed, remember also, to the faults of the patricians, for one of the laws passed by Calvus Stolo was that the Sibylline books should be in custody of ten men, of whom five should be plebeian, “ that no falsifications might be introduced in favour of the patricians.”

20. All this time, however, we have got no name for the prettiest of all stems,—that of annual flowers growing high from among their ground leaves, like lilies of the valley, and saxifrages, and the tall primulas—of which this pretty type, Fig. 15, was cut for me by Mr. Burgess years ago ; admirable in its light outline of the foamy globe of flowers, supported and balanced in the meadow breezes on that elastic rod of slenderest life.

What shall we call it ? We had better rest from our study of terms a little, and do a piece of needful classifying, before we try to name it.

21. My younger readers will find it easy to learn, and convenient to remember, for a beginning of their science,

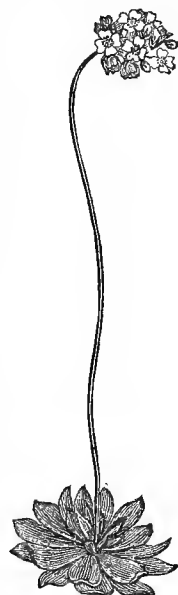


FIG. 15.

the names of twelve great families of cinquefoiled flowers,* of which the first group of three, is for the most part golden, the second, blue, the third, purple, and the fourth, red.

And their names, by simple lips, can be pleasantly said, or sung, in this order, the two first only being a little difficult to get over.

1	2	3	4
Roof-foil,	Lucy,	Pea,	Pink,
Rock-foil,	Blue-bell,	Pansy,	Peaeh,
Primrose.	Bindweed.	Daisy.	Rose.

Which even in their Latin magniloquence will not be too terrible, namely,—

1	2	3	4
Stella,	Lucia,	Alata,	Clarissa,
Francesca,	Campanula,	Viola,	Persica,
Primula.	Convoluta.	Margarita.	Rosa.

22. I do not care much to assert or debate my reasons for the changes of nomenclature made in this list. The

* The florets gathered in the daisy are cinquefoils, examined closely. No system founded on colour can be very general or unexceptionable : but the splendid purples of the pansy, and thistle, which will be made one of the lower composite groups under Margarita, may justify the general assertion of this order's being purple.

most gratuitous is that of 'Lucy' for 'Gentian,' because the King of Macedon, from whom the flower has been so long named, was by no means a person deserving of so consecrated memory. I conceive no excuse needed for rejecting Caryophyll, one of the crudest and absurdest words ever coined by unscholarly men of science; or Papilionaceæ, which is unendurably long for pease; and when we are now writing Latin, in a sentimental temper, and wish to say that we gathered a daisy, we shall not any more be compelled to write that we gathered a 'Bellidem perennem,' or, an *Oculum Diei*.'

I take the pure Latin form, *Margarita*, instead of *Margareta*, in memory of Margherita of Cortona,* as well as of the great saint: also the tiny scatterings and sparklings of the daisy on the turf may remind us of the old use of the word '*Margaritæ*,' for the minute particles of the Host sprinkled on the patina—"Has particulas *μερίδας* vocat *Euchologium*, *μαργαρίτας* *Liturgia Chrysostomi*."† My young German readers will, I hope, call the flower *Gretschén*,—unless they would uproot the daisies of the Rhine, lest French girls should also count their love-lots by the *Marguerite*. I must be so ungracious to my fair young readers, however, as to warn them that this trial of their lovers is a very favourable one, for, in nine blossoms out of

* See Miss Yonge's exhaustive account of the name, '*History of Christian Names*,' vol. i., p. 265.

† (Du Cange.) The word '*Margarete*' is given as heraldic English for pearl, by Lady Juliana Berners, in the book of St. Albans.

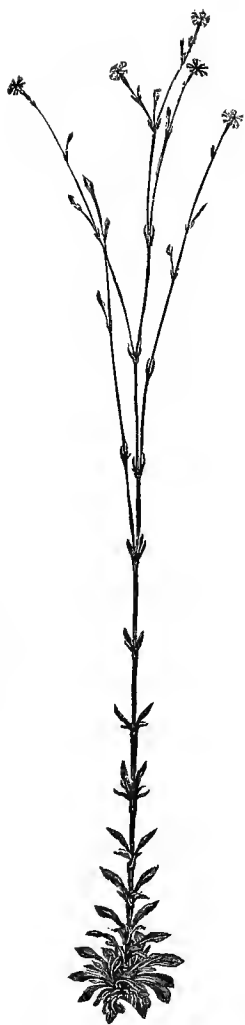
ten, the leaves of the Marguerite are odd, so that, if they are only gracious enough to begin with the supposition that he loves them, they must needs end in the conviction of it.

23. I am concerned, however, for the present, only with my first or golden order, of which the Roof-foil, or house-leek, is called in present botany, *Sedum*, 'the squatter,' because of its way of fastening itself down on stones, or roof, as close as it can sit. But I think this an ungraceful notion of its behaviour; and as its blossoms are, of all flowers, the most sharply and distinctly star-shaped, I shall call it '*Stella*' (providing otherwise, in due time, for the poor little chickweeds;) and the common stonecrop will therefore be '*Stella domestica*.'

The second tribe, (at present *saxifraga*,) growing for the most part wild on rocks, may, I trust, even in Protestant botany, be named *Francesca*, after St. Francis of Assisi; not only for its modesty, and love of mountain ground, and poverty of colour and leaf; but also because the chief element of its decoration, seen close, will be found in its spots, or *stigmata*.

In the nomenclature of the third order I make no change.

24. Now all this group of golden-blossoming plants agree in general character of having a rich cluster of radical leaves, from which they throw up a single stalk bearing clustered blossoms; for which stalk, when entirely leafless, I intend always to keep the term '*virgula*,' the



A



B



LINE-STUDY III.



LINE-STUDY IV.

'little rod'—not painfully caring about it, but being able thus to define it with precision, if required. And these are connected with the stems of branching shrubs through infinite varieties of structure, in which the first steps of transition are made by carrying the cluster of radical leaves up, and letting them expire gradually from the rising stem: the changes of form in the leaves as they rise higher from the ground being one of quite the most interesting specific studies in every plant. I had set myself once, in a bye-study for foreground drawing, hard on this point; and began, with Mr. Burgess, a complete analysis of the foliation of annual stems; of which Line-studies II., III., and IV., are examples; reduced copies, all, from the beautiful *Flora Danica*. But after giving two whole lovely long summer days, under the Giesbach, to the blue scabions, ('Devil's bit,') and getting in that time, only half-way up it, I gave in; and must leave the work to happier and younger souls.

25. For these flowering stems, therefore, possessing nearly all the complex organization of a tree, but not its permanence, we will keep the word 'virga;' and 'virgula' for those that have no leaves. I believe, when we come to the study of leaf-order, it will be best to begin with these annual virgæ, in which the leaf has nothing to do with preparation for a next year's branch. And now the remaining terms commonly applied to stems may be for the most part dispensed with; but several are interesting, and must be examined before dismissal.

26. Indeed, in the first place, the word we have to use so often, 'stalk,' has not been got to the roots of, yet. It comes from the Greek *στέλεχος*, (*stelechos*), the 'holding part' of a tree, that which is like a handle to all its branches; 'stock' is another form in which it has come down to us: with some notion of its being the mother of branches: thus, when Athena's olive was burnt by the Persians, two days after, a shoot a cubit long had sprung from the 'stelechos,' of it.

27. Secondly. Few words are more interesting to the modern scholarly and professorial mind than 'stipend.' (I have twice a year at present to consider whether I am worth mine, sent with compliments from the Curators of the University chest). Now, this word comes from 'stips,' small pay, which itself comes from 'stipo,' to press together, with the idea of small coin heaped up in little towers or piles. But with the idea of lateral pressing together, instead of downward, we get 'stipes,' a solid log; in Greek, with the same sense, *στύπος*, (*stupos*), whence, gradually, with help from another word meaning to beat, (and a side-glance at beating of hemp,) we get our 'stupid,' the German stumph, the Scottish sumph, and the plain English 'stump.'

Refining on the more delicate sound of stipes, the Latins got 'stipula,' the thin stem of straw: which rustles and ripples daintily in verse, associated with *spica* and *spiculum*, used of the sharp pointed ear of corn, and its fine processes of fairy shafts.

28. There are yet two more names of stalk to be studied, though, except for particular plants, not needing to be used,—namely, the Latin *can-dex*, and *can-lis*, both connected with the Greek *καυλός*, properly meaning a solid stalk like a handle, passing into the sense of the hilt of a sword, or quill of a pen. Then, in Latin, *caudex* passes into the sense of log, and so, of cut plank or tablet of wood; thus finally becoming the classical ‘*codex*’ of writings engraved on such wooden tablets, and therefore generally used for authoritative manuscripts.

Lastly, ‘*caulis*,’ retained accurately in our cauliflower, contracted in ‘*colewort*,’ and refined in ‘*kail*,’ softens itself into the French ‘*chou*,’ meaning properly the whole family of thick-stalked eatable salads with spreading heads; but these being distinguished explicitly by Pliny as ‘*Capitati*,’ ‘salads with a head,’ or ‘*Captain salads*,’ the mediæval French softened the ‘*caulis capitatus*’ into ‘*chou cabus*;’—or, to separate the round or apple-like mass of leaves from the flowery foam, ‘*cabus*’ simply, by us at last enriched and emphasized into ‘*cabbage*.’

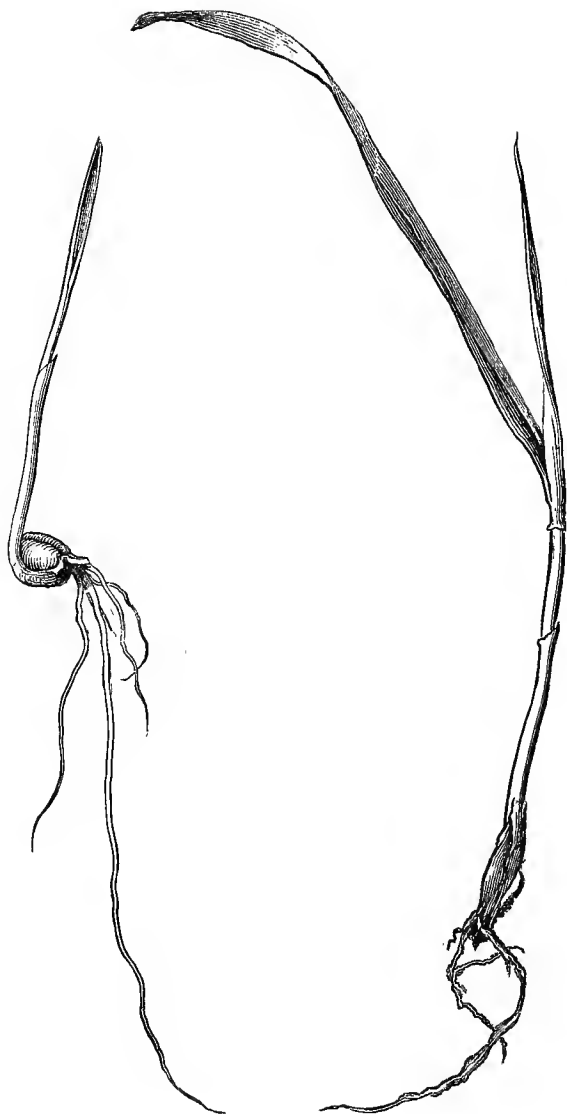
29. I believe we have now got through the stiffest piece of etymology we shall have to master in the course of our botany; but I am certain that young readers will find patient work, in this kind, well rewarded by the groups of connected thoughts which will thus attach themselves to familiar names; and their grasp of every language they learn must only be esteemed by them secure when they recognize its derivatives in these homely associations,

and are as much at ease with the Latin or French syllables of a word as with the English ones; this familiarity being above all things needful to cure our young students of their present ludicrous impression that what is simple, in English, is knowing, in Greek; and that terms constructed out of a dead language will explain difficulties which remained insoluble in a living one. But Greek is *not* yet dead: while if we carry our unscholarly nomenclature much further, English soon will be; and then doubtless botanical gentlemen at Athens will for some time think it fine to describe what we used to call caryophyllaceæ, as the *ἐδληφιδες*.

30. For indeed we are all of us yet but school-boys, clumsily using alike our lips and brains; and with all our mastery of instruments and patience of attention, but few have reached, and those dimly, the first level of science,—wonder.

For the first instinct of the stem,—unnamed by us yet—unthought of,—the instinct of seeking light, as of the root to seek darkness,—what words can enough speak the wonder of it.

Look. Here is the little thing, Line-study V. (A), in its first birth to us: the stem of stems; the one of which we pray that it may bear our daily bread. The seed has fallen in the ground with the springing germ of it downwards; with heavenly cunning the taught stem curls round, and seeks the never-seen light. Veritable ‘conversion,’ miraculous, called of God. And here is the oat



LINE-STUDY V.

"Behold. a Sower went forth to sow."

germ, (B)—after the wheat, most vital of divine gifts; and assuredly, in days to come, fated to grow on many a naked rock in hitherto lifeless lands, over which the glancing sheaves of it will shake sweet treasure of innocent gold.

And who shall tell us how they grow; and the fashion of their rustling pillars—bent, and again erect, at every breeze. Fluted shaft or clustered pier, how poor of art, beside this grass-shaft—built, first to sustain the food of men, then to be strewn under their feet!

We must not stay to think of it, yet, or we shall get no farther till harvest has come and gone again. And having our names of stems now determined enough, we must in next chapter try a little to understand the different kinds of them.

The following notes, among many kindly sent me on the subject of Scottish Heraldry, seem to be the most trustworthy:—

“The earliest known mention of the thistle as the national badge of Scotland is in the inventory of the effects of James III., who probably adopted it as an appropriate illustration of the royal motto, *In defence*.

“Thistles occur on the coins of James IV., Mary, James V., and James VI.; and on those of James VI. they are for the first time accompanied by the motto, *Nemo me impune lacesset*.

“A collar of thistles appears on the gold bonnet-pieces of James V. of 1539; and the royal ensigns, as depicted in Sir David Lindsay’s armorial register of 1542, are surrounded by a collar formed entirely of golden thistles, with an oval badge attached.

“This collar, however, was a mere device until the institution, or, as it is generally but inaccurately called, the revival, of the order of the Thistle by James VII (II. of England), which took place on May 29, 1687.”

Date of James III.'s reign 1460—1488.

CHAPTER IX.

OUTSIDE AND IN.

1. THE elementary study of methods of growth, given in the following chapter, has been many years written, (the greater part soon after the fourth volume of 'Modern Painters'); and ought now to be rewritten entirely; but having no time to do this, I leave it with only a word or two of modification, because some truth and clearness of incipient notion will be conveyed by it to young readers, from which I can afterwards lop the errors, and into which I can graft the finer facts, better than if I had a less blunt embryo to begin with.

2. A stem, then, broadly speaking, (I had thus began the old chapter,) is the channel of communication between the leaf and root; and if the leaf can grow directly from the root there is no stem: so that it is well first to conceive of all plants as consisting of leaves and roots only, with the condition that each leaf must have its own quite particular root* somewhere.

* Recent botanical research makes this statement more than doubtful. Nevertheless, on no other supposition can the forms and action of tree-branches, so far as at present known to me, be yet clearly accounted for.

Let a b c, Fig. 16, be three leaves, each, as you see, with its own root, and by no means dependent on other leaves for its daily bread; and let the horizontal line be the surface of the ground. Then the plant has no stem, or an underground one. But if the three leaves rise above the ground, as in Fig. 17, they must reach their roots

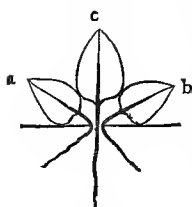


FIG. 16.

by elongating their stalks, and this elongation is the stem of the plant. If the outside leaves grow last, and are therefore youngest, the plant is said to grow from the outside. You know that 'ex' means out, and that 'gen' is the first syllable of Genesis (or creation), therefore the old botanists, putting an o between the two syllables, called plants whose outside leaves grew last, Ex-o-gens. If the inside leaf grows last, and is youngest, the plant was said to grow from

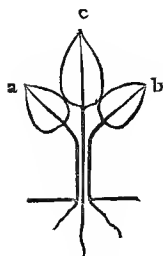


FIG. 17.

the inside, and from the Greek Endon, within, called an 'Endo-gen.' If these names are persisted in, the Greek botanists, to return the compliment, will of course call Endogens *Ἰνσειδβορνιδες*, and Exogens *Ουτσειδβορνιδες*. In the Oxford school, they will be called simply Inlaid and Outlaid.

3. You see that if the outside leaves are to grow last, they may conveniently grow two at a time; which they accordingly do, and exogens always start with two little



FIG. 18.

leaves from their roots, and may therefore conveniently be called two-leaved; which, if you please, we will for our parts call them. The botanists call them 'two-suckered,' and can't be content to call them *that* in English; but drag in a long Greek word, meaning the fleshy sucker of the sea-devil,—'cotyledon,' which, however, I find is practically getting shortened into 'cot,' and that they will have to end by calling endogens, monocots, and exogens, bicots. I mean steadily to call them one-leaved and two-leaved, for this further reason, that they differ not merely in the single or dual springing of first leaves from the seed; but in the distinctly single or dual arrangement of leaves afterwards on the stem; so that, through all the complexity obtained by alternate and spiral placing, every bicot or two-leaved flower or tree is in reality composed of dual groups of leaves, separated by a given length of stem; as, most characteristically in this pure mountain type of the Ragged Robin (*Clarissa laciniosa*), Fig. 18; and compare A, and B, Line-study II.; while, on the other hand, the monocot plants are by close analysis, I think, always resolvable into successively climbing leaves, sessile on one another, and sending their roots,



FIG. 19.

or processes, for nourishment, down through one another, as in Fig. 19.

4. Not that I am yet clear, at all, myself; but I do think it's more the botanists' fault than mine, what 'cotyledonous' structure there may be at the outer base of each successive bud; and still less, how the intervenient length of stem, in the bicots, is related to their power, or law, of branching. For not only the two-leaved tree is outlaid, and the one-leaved inlaid, but the two-leaved tree is branched, and the one-leaved tree is not branched. This is a most vital and important distinction, which I state to you in very bold terms, for though there are some apparent exceptions to the law, there are, I believe, no real ones, if we define a branch rightly. Thus, the head of a palm tree is merely a cluster of large leaves; and the spike of a grass, a clustered blossom. The stem, in both, is unbranched; and we should be able in this respect to classify plants very simply indeed, but for a provoking species of intermediate creatures whose branching is always in the manner of corals, or sponges, or arborescent minerals, irregular and accidental, and essentially, therefore, distinguished from the systematic anatomy of a truly branched tree. Of these presently; we must go on by very short steps: and I find no step can be taken without check from existing generalizations. Sowerby's definition of Monocotyledons, in his ninth volume, begins thus: "Herbs, (or rarely, and only in exotic genera,) trees, in which the wood, pith, and bark are indistinguishable."

•

Now if there be one plant more than another in which the pith is defined, it is the common Rush; while the nobler families of true herbs derive their principal character from being pithless altogether! We cannot advance too slowly.

5. In the families of one-leaved plants in which the young leaves grow directly out of the old ones, it becomes a grave question for them whether the old ones are to lie flat or edgeways, and whether they must therefore grow out of their faces or their edges. And we must at once understand the way they contrive it, in either case.

Among the many forms taken by the Arethusan leaf, one of the commonest is long and gradually tapering,—much broader at the base than the point. We will take such an one for examination, and suppose that it is growing on the ground as in Fig. 20, with a root to its every fibre. Cut out a piece of strong paper roughly into the shape of this Arethusan leaf, a, Fig. 21. Now suppose the next young leaf has to spring out of the front of this one, at about the middle of its height. Give it two nicks with the scissors at b b; then roll up the lower part into a cylinder, (it will overlap a good deal at the bottom,) and tie it fast with a fine thread: so, you will get the form at c. Then bend the top of it back, so that, seen sideways, it appears as at d, and you see you have made quite a little flower-pot to plant your

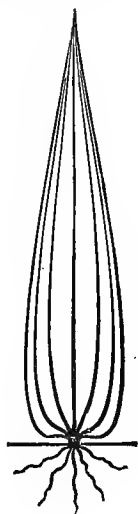


FIG. 20.

new leaf in, and perhaps it may occur to you that you have seen something like this before. Now make another, a little less wide, but with the part for the cylinder twice as long, roll it up in the same way, and slip it inside the other, with the flat part turned the other way, e. Surely this reminds

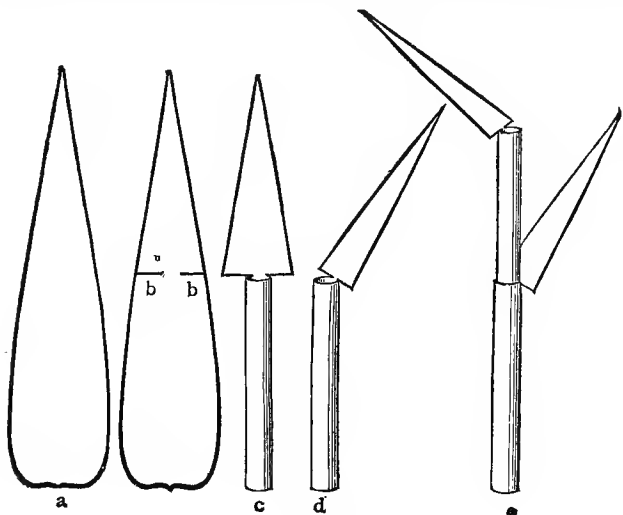


FIG. 21.

you now of something you have seen? Or must I draw the something (Fig. 22)?

6. All grasses are thus constructed, and have their leaves set thus, opposite, on the sides of their tubular stems, alternately, as they ascend. But in most of them there is also a peculiar construction, by which, at the base of the sheath, or enclosing tube, each leaf articulates itself with the rest of the stem at a ringed knot, or joint.

Before examining these, remember there are mainly two sorts of joints in the framework of the bodies of animals. One is that in which the bone is thick at the joints and thin between them, (see the bone of the next chicken leg you eat), the other is that of animals that have shells or horny coats, in which characteristically the shell is thin at the joints, and thick between them (look at the next lobster's claw you can see, without eating). You know, also, that though the crustaceans are titled only from their crusts, the name 'insect' is given to the whole insect tribe, because they are farther jointed almost into *sections*: it is easily remembered, also, that the projecting joint means strength and elasticity in the creature, and that all its limbs are useful to it, and cannot conveniently be parted with; and that the incised, sectional, or insectile joint means more or less weakness,* and necklace-like laxity or license in the creature's make; and an ignoble power of shaking off its legs or arms on occasion, coupled also with modes of growth involving occasionally quite astonishing transformations, and beginnings of new life under new circumstances; so that, until very lately, no mortal knew what a crab was like in its youth, the very existence



FIG. 22.

* Not always in muscular power; but the framework on which strong muscles are to act, as that of an insect's wing, or its jaw, is never insectile.

of the creature, as well as its legs, being jointed, as it were, and made in separate pieces with the narrowest possible thread of connection between them; and its principal, or stomachic, period of life, connected with its sentimental period by as thin a thread as a wasp's stomach is with its thorax.

7. Now in plants, as in animals, there are just the same opposed aspects of joint, with this specialty of difference in function, that the animal's limb bends at the joints, but the vegetable limb stiffens. And when the articulation projects, as in the joint of a cane, it means not only that the strength of the plant is well carried through the junction, but is carried farther and more safely than it could be without it: a cane is stronger, and can stand higher than it could otherwise, because of its joints. Also, this structure implies that the plant has a will of its own, and a position which on the whole it will keep, however it may now and then be bent out of it; and that it has a continual battle, of a healthy and humanlike kind, to wage with surrounding elements.

But the crabby, or insect-like, joint, which you get in seaweeds and cacti, means either that the plant is to be dragged and wagged here and there at the will of waves, and to have no spring nor mind of its own; or else that it has at least no springy intention and elasticity of purpose, but only a knobby, knotty, prickly, malignant stubbornness, and incoherent opiniativeness; crawling about, and cogging, and grovelling, and aggregating

anyhow, like the minds of so many people whom one knows!

8. Returning then to our grasses, in which the real rooting and junction of the leaves with each other is at these joints; we find that therefore every leaf of grass may be thought of as consisting of two main parts, for which we shall want two separate names. The lowest part, which wraps itself round to become strong, we will call the 'staff,' and for the free-floating outer part we will take specially the name given at present carelessly to a large number of the plants themselves, 'flag.' This will give a more clear meaning to the words 'rod' (*virga*), and 'staff' (*baculus*), when they occur together, as in the 23rd Psalm; and remember the distinction is that a rod bends like a switch, but a staff is stiff. I keep the well-known name 'blade' for grass-leaves in their fresh green state.

9. You felt, as you were bending down the paper into the form d, Fig. 21, the difficulty and awkwardness of the transition from the tubular form of the staff to the flat one of the flag. The mode in which this change is effected is one of the most interesting features in plants, for you will find presently that the leaf-stalk in ordinary leaves is only a means of accomplishing the same change from round to flat. But you know I said just now that some leaves were not flat, but set upright, edgeways. It is not a common position in two-leaved trees; but if you can run out and look at an *arbor vitæ*, it may interest you

to see its hatchet-shaped vertically crested cluster of leaves transforming themselves gradually downwards into branches; and in one-leaved trees the vertically edged group is of great importance.

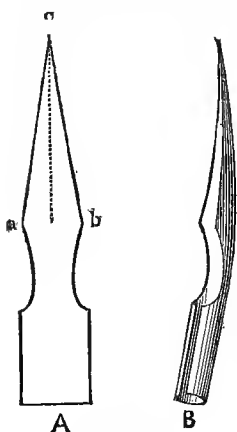


FIG. 23.

10. Cut out another piece of paper like *a* in Fig. 21, but now, instead of merely giving it nicks at *a*, *b*, cut it into the shape *A*, Fig. 23. Roll the lower part up as before, but instead of pulling the upper part down, pinch its back at the dotted line, and bring the two points, *a* and *b*, forward, so that they may touch each other. *B*

shows the look of the thing half-done, before the points *a* and *b* have quite met. Pinch them close, and stitch the two edges neatly together, all the way from *a* to the point *c*; then roll and tie up the lower part as before. You will find then that the back or spinal line of the whole leaf is bent forward, as at *B*. Now go out to the garden and gather the green leaf of a fleur-de-lys, and look at it and your piece of disciplined paper together; and I fancy you will probably find out several things for yourself that I want you to know.

11. You see, for one thing, at once, how *strong* the fleur-de-lys leaf is, and that it is just twice as strong as a blade of grass, for it is the substance of the staff, with its sides flattened together, while the grass blade is a staff cut

open and flattened out. And you see that as a grass blade necessarily flaps down, the fleur-de-lys leaf as necessarily curves up, owing to that inevitable bend in its back. And you see, with its keen edge, and long curve, and sharp point, how like a sword it is. The botanists would for once have given a really good and right name to the plants which have this kind of leaf, 'Ensatae,' from the Latin 'ensis,' a sword; if only sata had been properly formed from sis. We can't let the rude Latin stand, but you may remember that the fleur-de-lys, which is the flower of chivalry, has a sword for its leaf, and a lily for its heart.

12. In case you cannot gather a fleur-de-lys leaf, I have drawn for you, in Plate VI., a cluster of such leaves, which are as pretty as any, and so small that, missing the points of a few, I can draw them of their actual size. You see the pretty alternate interlacing at the bottom, and if you can draw at all, and will try to outline their curves, you will find what subtle lines they are. I did not know this name for the strong-edged grass leaves when I wrote the pieces about shield and sword leaves in 'Modern Painters'; I wish I had chanced in those passages on some other similitude, but I can't alter them now, and my trustful pupils may avoid all confusion of thought by putting gladius for ensis, and translating it by the word 'scymitar,' which is also more accurate in expressing the curvature blade. So we will call the ensatae, instead, 'gladiolae,' translating, 'scymitar-grasses.' And having

now got at some clear idea of the distinction between outlaid and inlaid growth in the stem, the reader will find the elementary analysis of forms resulting from outlaid growth in 'Modern Painters'; and I mean to republish it in the sequel of this book, but must go on to other matters here. The growth of the inlaid stem we will follow as far as we need, for English plants, in examining the glasses.

FLORENCE, 11th September, 1874.

As I correct this chapter for press, I find it is too imperfect to be let go without a word or two more. In the first place, I have not enough, in distinguishing the nature of the living yearly shoot, with its cluster of fresh leafage, from that of the accumulated mass of perennial trees, taken notice of the similar power even of the annual shoot, to obtain some manner of immortality for itself, or at least of usefulness, *after* death. A Tuscan woman stopped me on the path up to Fiesole last night, to beg me to buy her plaited straw. I wonder how long straw lasts, if one takes care of it? A Leghorn bonnet, (if now such things are,) carefully put away,—even properly taken care of when it is worn,—how long will it last, young ladies?

I have just been reading the fifth chapter of II. Esdras, and am fain to say, with less discomfort than otherwise I might have felt, (the example being set me by the archangel Uriel,) "I am not sent to tell thee, for I do not know." How old is the oldest straw known? the oldest

linen? the oldest hemp? We have mummy wheat,—cloth of papyrus, which is a kind of straw. The paper reeds by the brooks, the flax-flower in the field, leave such imperishable frame behind them. And Ponte-della-Paglia, in Venice; and Straw Street, of Paris, remembered in Heaven,—there is no occasion to change their names, as one may have to change ‘Waterloo Bridge,’ or the ‘Rue de l’Impératrice.’ Poor Empress! Had she but known that her true dominion was in the straw streets of her fields; not in the stone streets of her cities!

But think how wonderful this imperishableness of the stem of many plants is, even in their annual work: how much more in their perennial work! The noble stability between death and life, of a piece of perfect wood? It cannot grow, but will not decay; keeps record of its years of life, but surrenders them to become a constantly serviceable thing: which may be sailed in, on the sea, built with, on the land, carved by Donatello, painted on by Fra Angelico. And it is not the wood’s fault, but the fault of Florence in not taking proper care of it, that the panel of Sandro Botticelli’s loveliest picture has cracked, (not with heat, I believe, but blighting frost), a quarter of an inch wide through the Madonna’s face.

But what is this strange state of undecaying wood? What sort of latent life has it, which it only finally parts with when it rots?

Nay, what is the law by which its natural life is measured? What makes a tree ‘old’? One sees the Spanish-

chestnut trunks among the Apennines growing into caves, instead of logs. Vast hollows, confused among the recessed darknesses of the marble crags, surrounded by mere laths of living stem, each with its coronal of glorious green leaves. Why can't the tree go on, and on,—hollowing itself into a Fairy—no—a Dryad, Ring,—till it becomes a perfect Stonehenge of a tree? Truly, "I am not sent to tell thee, for I do not know."

The worst of it is, however, that I don't know one thing which I ought very thoroughly to have known at least thirty years ago, namely, the true difference in the way of building the trunk in outlaid and inlaid wood. I have an idea that the stem of a palm-tree is only a heap of leaf-roots built up like a tower of bricks, year by year, and that the palm-tree really grows on the top of it, like a bunch of fern; but I've no books here, and no time to read them if I had. If only I were a strong giant, instead of a thin old gentleman of fifty-five, how I should like to pull up one of those little palm-trees by the roots—(by the way, what are the roots of a palm like? and, how does it stand in sand, where it is wanted to stand, mostly? Fancy, not knowing that, at fifty-five!)—that grow all along the Riviera; and snap its stem in two, and cut it down the middle. But I suppose there are sections enough now in our grand botanical collections, and you can find it all out for yourself. That you should be able to ask a question clearly, is two-thirds of the way to getting it answered; and I think this chapter of mine will at

least enable you to ask some questions about the stem, though what a stem *is*, truly, "I am not sent to tell thee, for I do not know."

KNARESBOROUGH, 30th April, 1876.

I see by the date of last paragraph that this chapter has been in my good Aylesbury printer's type for more than a year and a half. At this rate, Proserpina has a distant chance of being finished in the spirit-land, with more accurate information derived from the archangel Uriel himself, (not that he is likely to know much about the matter, if he keeps on letting himself be prevented from ever seeing foliage in spring-time by the black demon-winds,) about the year 2000. In the meantime, feeling that perhaps I *am* sent to tell my readers a little more than is above told, I have had recourse to my botanical friend, good Mr. Oliver of Kew, who has taught me, first, of palms, that they actually stitch themselves into the ground, with a long dipping loop, up and down, of the root fibres, concerning which sempstress work I shall have a month's puzzlement before I can report on it; secondly, that all the increment of tree stem is, by division and multiplication of the cells of the wood, a process not in the least to be described as 'sending down roots from the leaf to the ground.' I suspected as much in beginning to revise this chapter; but hold to my judgment in not cancelling it. For this multiplication of the cells is at least compelled by an influence which passes from the leaf to the ground, and vice versâ; and which is at present best

conceivable to me by imagining the continual and invisible descent of lightning from electric cloud by a conducting rod, endowed with the power of softly splitting the rod into two rods, each as thick as the original one. Studying microscopically, we should then see the molecules of copper, as we see the cells of the wood, dividing and increasing, each one of them into two. But the visible result, and mechanical conditions of growth, would still be the same as if the leaf actually sent down a new root fibre ; and, more than this, the currents of accumulating substance, marked by the grain of the wood, are, I think, quite plainly and absolutely those of streams flowing only from the leaves downwards ; never from the root up, nor of mere lateral increase. I must look over all my drawings again, and at tree stems again, with more separate study of the bark and pith in those museum sections, before I can assert this ; but there will be no real difficulty in the investigation. If the increase of the wood is lateral only, the currents round the knots will be compressed at the sides, and open above and below ; but if downwards, compressed above the knot and open below it. The nature of the force itself, and the manner of its ordinances in direction, remain, and must for ever remain, inscrutable as our own passions, in the hand of the God of all Spirits, and of all Flesh.

“ Drunk is each ridge, of thy cup drinking,
Each clod relenteth at thy dressing,

Thy cloud-borne waters inly sinking,
Fair spring sproutes forth, blest with thy blessing ;
The fertile year is with thy bounty crowned,
And where thou go'st, thy goings fat the ground.

Plenty bedews the desert places,
A hedge of mirth the hills encloseth.
The fields with flockes have hid their faces,
A robe of corn the valleys clotheth,
Deserts and hills and fields and valleys all,
Rejoice, shout, sing, and on thy name do call."

CHAPTER X.

THE BARK.

1. PHILOLOGISTS are continually collecting instances, like our friend the French critic of Virgil, of the beauty of finished language, or the origin of unfinished, in the imitation of natural sounds. But such collections give an entirely false idea of the real power of language, unless they are balanced by an opponent list of the words which signally fail of any such imitative virtue, and whose sound, if one dwelt upon it, is destructive of their meaning.

2. For instance. Few sounds are more distinct in their kind, or one would think more likely to be vocally reproduced in the word which signified them, than that of a swift rent in strongly woven cloth; and the English word, 'rag' and ragged, with the Greek *ρήγνυμι*, do indeed in a measure recall the tormenting effect upon the ear. But it is curious that the verb which is meant to express the actual origination of rags, should rhyme with two words entirely musical and peaceful—words, indeed, which I always reserve for final resource in passages which I want to be soothing as well as pretty,—'fair,' and

‘air ;’ while, in its orthography, it is identical with the word representing the bodily sign of tenderest passion, and grouped with a multitude of others,* in which the mere insertion of a consonant makes such wide difference of sentiment as between ‘dear’ and ‘drear,’ or ‘pear’ and ‘spear.’ The Greek root, on the other hand, has persisted in retaining some vestige of its excellent dissonance, even where it has parted with the last vestige of the idea it was meant to convey ; and when Burns did his best,—and his best was above most men’s—to gather pleasant liquid and labial syllabbling, round gentle meaning, in

“ Bonnie lassie, will ye go,
Will ye go, will ye go,
Bonnie lassie, will ye go,
To the birks of Aberfeldy ? ”

he certainly had little thought that the delicately crisp final k, in birk, was the remnant of a magnificent Greek effort to express the rending of the earth by earthquake, in the wars of the giants. In the middle of that word ‘esmaragēse,’ we get our own beggar’s ‘rag’ for a pure root, which afterwards, through the Latin frango, softens into our ‘break,’ and ‘bark,’—the ‘broken thing’ ; that idea of its rending around the tree’s stem having been, in the very earliest human efforts at botanical description,

* It is one of the three cadences, (the others being of the words rhyming to ‘mind’ and ‘way,’) used by Sir Philip Sidney in his marvellous paraphrase of the 55th Psalm.

attached to it by the pure Aryan race, watching the strips of rosy satin break from the birch stems, in the Aberfeldys of Imaus.

3. That this tree should have been the only one which "the Aryans, coming as conquerors from the North, were able to recognize in Hindostan," * and should therefore also be "the only one whose name is common to Sanskrit, and to the languages of Europe," delighted me greatly, for two reasons: the first, for its proof that in spite of the development of species, the sweet gleaming of birch stem has never changed its argent and sable for any unchequered heraldry; and the second, that it gave proof of a much more important fact, the keenly accurate observation of Aryan foresters at that early date; for the fact is that the breaking of the thin-beaten silver of the birch trunk is so delicate, and its smoothness so graceful, that until I painted it with care, I was not altogether clear-headed myself about the way in which the chequering was done: nor until Fors to-day brought me to the house of one of my father's friends at Carshalton, and gave me three birch stems to look at just outside the window, did I perceive it to be a primal question about them, what it is that blanches that dainty dress of theirs, or, anticipatorily, weaves. What difference is there between the making of the corky excrescence of other

* Lectures on the Families of Speech, by the Rev. F. Farrer. Longman, 1870. Page 81.

trees, and of this almost transparent fine white linen? I perceive that the older it is, within limits, the finer and whiter; hoary tissue, instead of hoary hair—honouring the tree's aged body; the outer sprays have no silvery light on their youth. Does the membrane thin itself into whiteness merely by stretching, or produce an outer film of new substance? *

4. And secondly, this investiture, why is it transverse to the trunk,—swathing it, as it were, in bands? Above all,—when it breaks,—why does it break round the tree instead of down? All other bark breaks as anything would, naturally, round a swelling rod, but this, as if the stem were growing longer; until, indeed, it reaches farthest heroic old age, when the whiteness passes away again, and the rending is like that of other trees, downwards. So that, as it were in a changing language, we have the great botanical fact twice taught us, by this tree of Eden, that the skins of trees differ from the skins of the higher animals in that, for the most part, they won't stretch, and must be worn torn.

So that in fact the most popular arrangement of vegetative adult costume is Irish; a normal investiture in honorable rags; and decorousness of tattering, as of a banner borne in splendid ruin through storms of war.

5. Now therefore, if we think of it, we have five dis-

* I only profess, you will please to observe, to ask questions in *Proserpina*. Never to answer any. But of course this chapter is to introduce some further inquiry in another place.

inct orders of investiture for organic creatures ; first, mere secretion of mineral substance, chiefly lime, into a hard shell, which, if broken, can only be mended, like china—by sticking it together ; secondly, organic substance of armour which grows into its proper shape at once for good and all, and can't be mended at all, if broken, (as of insects) ; thirdly, organic substance of skin, which stretches, as the creature grows, by cracking, over a fresh skin which is supplied beneath it, as in bark of trees ; fourthly, organic substance of skin cracked symmetrically into plates or scales which can increase all round their edges, and are connected by softer skin, below, as in fish and reptiles, (divided with exquisite lustre and flexibility, in feathers of birds) ; and lastly, true elastic skin, extended in soft unison with the creature's growth,—blushing with its blood, fading with its fear ; breathing with its breath, and guarding its life with sentinel beneficence of pain.

6. It is notable, in this higher and lower range of organic beauty, that the decoration, by pattern and colour, which is almost universal in the protective coverings of the middle ranks of animals, should be reserved in vegetables for the most living part of them, the flower only : and that among animals, few but the malignant and senseless are permitted, in the corrugation of their armour, to resemble the half-dead trunk of the tree, as they float beside it in the tropical river. I must, however, leave the scale patterns of the palms and other inlaid tropical

stems for after-examination,—content, at present, with the general idea of the bark of an outlaid tree as the successive accumulation of the annual protecting film, rent into ravines of slowly increasing depth, and coloured, like the rock, whose stability it begins to emulate, with the grey or gold of clinging lichen and embroidering moss.

CHAPTER XI.

GENEALOGY.

1. RETURNING, after more than a year's sorrowful interval, to my Sicilian fields,—not incognisant, now, of some of the darker realms of Proserpina ; and with feebler heart, and, it may be, feebler wits, for wandering in her brighter ones,—I find what I had written by way of sequel to the last chapter, somewhat difficult, and extremely tiresome. Not the less, after giving fair notice of the difficulty, and asking due pardon for the tiresomeness, I am minded to let it stand ; trusting to end, with it, once for all, investigations of the kind. But in finishing this first volume of my School Botany, I must try to give the reader some notion of the plan of the book, as it now, during the time for thinking over it which illness left me, has got itself arranged in my mind, within limits of possible execution. And this the rather, because I wish also to state, somewhat more gravely than I have yet done, the grounds on which I venture here to reject many of the received names of plants ; and to substitute others for them, relating to entirely different attributes



Drawn by J. Ruskin.

VI.

Radical Insertion of leaves of *Ensatae*.

IRIS GERMANICA.

from those on which their present nomenclature is confusedly edified.

I have already in some measure given the reasons for this change ;* but I feel that, for the sake of those among my scholars who have laboriously learned the accepted names, I ought now also to explain its method more completely.

2. I call the present system of nomenclature *confusedly* edified, because it introduces,—without, apparently, any consciousness of the inconsistency, and certainly with no apology for it,—names founded sometimes on the history of plants, sometimes on their qualities, sometimes on their forms, sometimes on their products, and sometimes on their poetical associations.

On their history—as ‘Gentian’ from King Gentius, and Funkia from Dr. Funk.

On their qualities—as ‘Scrophularia’ from its (quite uncertified) use in scrofula.

On their forms—as the ‘Caryophylls’ from having petals like husks of nuts.

On their products—as ‘Cocos nucifera’ from its nuts.

And on their poetical associations,—as the Star of Bethlehem from its imagined resemblance to the light of that seen by the Magi.

3. Now, this variety of grounds for nomenclature might patiently, and even with advantage, be permitted,

* See Introduction, pp. 5-8.

provided the grounds themselves were separately firm, and the inconsistency of method advisedly allowed, and, in each case, justified. If the histories of King Gentius and Dr. Funk are indeed important branches of human knowledge ;—if the *Scrophulariaceæ* do indeed cure King's Evil ;—if pinks be best described in their likeness to nuts ;—and the Star of Bethlehem verily remind us of Christ's Nativity,—by all means let these and other such names be evermore retained. But if Dr. Funk be not a person in any special manner needing either stellification or florification ; if neither herb nor flower can avail, more than the touch of monarchs, against hereditary pain ; if it be no better account of a pink to say it is nut-leaved, than of a nut to say it is pink-leaved ; and if the modern mind, incurious respecting the journeys of wise men, has already confused, in its Bradshaw's Bible, the station of Bethlehem with that of Bethel,* it is certainly time to take some order with the partly false, partly useless, and partly forgotten literature of the Fields ; and, before we bow our children's memories to the burden of it, ensure that there shall be matter worth carriage in the load.

4. And farther, in attempting such a change, we must be clear in our own minds whether we wish our nomenclature to tell us something about the plant itself, or only to tell us the place it holds in relation to other plants : as, for instance, in the Herb-Robert, would it be well to

* See Sowerby's nomenclature of the flower, vol. ix., plate 1703.



VII.
CONTORTA PURPUREA.
PURPLE WREATH-WORT.

christen it, shortly, 'Rob Roy,' because it is pre-eminently red, and so have done with it ;—or rather to dwell on its family connections, and call it 'Macgregoraceous' ?

5. Before we can wisely decide this point, we must resolve whether our botany is intended mainly to be useful to the vulgar, or satisfactory to the scientific élite. For if we give names characterizing individuals, the circle of plants which any country possesses may be easily made known to the children who live in it : but if we give names founded on the connexion between these and others at the Antipodes, the parish school-master will certainly have double work ; and it may be doubted greatly whether the parish school-boy, at the end of the lecture, will have half as many ideas.

6. Nevertheless, when the features of any great order of plants are constant, and, on the whole, represented with great clearness both in cold and warm climates, it may be desirable to express this their citizenship of the world in definite nomenclature. But my own method, so far as hitherto developed, consists essentially in fastening the thoughts of the pupil on the special character of the plant, in the place where he is likely to see it ; and therefore, in expressing the power of its race and order in the wider world, rather by reference to mythological associations than to botanical structure.

7. For instance, Plate VII. represents, of its real size, an ordinary spring flower in our English mountain fields. It is an average example,—not one of rare size under rare

conditions,—rather smaller than the average, indeed, that I might get it well into my plate. It is one of the flowers whose names I think good to change ; but I look carefully through the existing titles belonging to it and its fellows, that I may keep all I expediently can. I find, in the first place, that Linnæus called one group of its relations, Ophryds, from Ophrys,—Greek for the eyebrow,—on account of their resemblance to the brow of an animal frowning, or to the overshadowing casque of a helmet. I perceive this to be really a very general aspect of the flower ; and therefore, no less than in respect to Linnæus, I adopt this for the total name of the order, and call them ‘ Ophrydæ,’ or, shortly, ‘ Ophryds.’

8. Secondly : so far as I know these flowers myself, I perceive them to fall practically into three divisions,—one, growing in English meadows and Alpine pastures, and always adding to their beauty ; another, growing in all sorts of places, very ugly itself, and adding to the ugliness of its indiscriminated haunts ; and a third, growing mostly up in the air, with as little root as possible, and of gracefully fantastic forms, such as this kind of nativity and habitation might presuppose. For the present, I am satisfied to give names to these three groups only. There may be plenty of others which I do not know, and which other people may name, according to their knowledge. But in all these three kinds known to me, I perceive one constant characteristic to be *some* manner of *distortion* ; and I desire that fact,—marking a

spiritual (in my sense of the word) character of extreme mystery,—to be the first enforced on the mind of the young learner. It is exhibited to the English child, primarily, in the form of the stalk of each flower, attaching it to the central virga. This stalk is always twisted once and a half round, as if somebody had been trying to wring the blossom off ; and the name of the family, in Proserpina, will therefore be ‘ Contorta ’* in Latin, and ‘ Wreathewort ’ in English.

Farther : the beautiful power of the one I have drawn in its spring life, is in the opposition of its dark purple to the primrose in England, and the pale yellow anemone in the Alps. And its individual name will be, therefore, ‘ Contorta purpurea ’—*Purple Wreathewort*.

And in drawing it, I take care to dwell on this strength of its color, and to show thoroughly that it is a *dark* blossom,† before I trouble myself about its minor characters.

9. The second group of this kind of flowers live, as I said, in all sorts of places ; but mostly, I think, in disagreeable ones,—torn and irregular ground, under alternations of unwholesome heat and shade, and among swarms of nasty insects. I cannot yet venture on any bold general statement about them, but I think that is mostly their way ; and at all events, they themselves are in the

* Linuæus used this term for the oleanders ; but evidently with less accuracy than usual.

† “ ἄνθη πορφύρεα ἰδῆ ” says Dioscorides, of the race generally,—but “ ἄνθη δὲ ἐπιπύρφυρα ” of this particular one.

habit of dressing in livid and unpleasant colors ; and are distinguished from all other flowers by twisting, not only their stalks, but one of their petals, not once and a half only, but two or three times round, and putting it far out at the same time, as a foul jester would put out his tongue : while also the singular power of grotesque mimicry, which, though strong also in the other groups of their race, seems in the others more or less playful, is, in these, definitely degraded, and, in aspect, malicious.

10. Now I find the Latin name ‘*Satyrium*’ attached already to one sort of these flowers ; and we cannot possibly have a better one for all of them. It is true that, in its first Greek form, Dioscorides attaches it to a white, not a livid, flower ; and I dare say there are some white ones of the breed : but, in its full sense, the term is exactly right for the entire group of ugly blossoms of which the characteristic is the spiral curve and protraction of their central petal : and every other form of Satyric ugliness which I find among the Ophryds, whatever its color, will be grouped with them. And I make them central, because this humour runs through the whole order, and is, indeed, their distinguishing sign.

11. Then the third group, living actually in the air, and only holding fast by, without nourishing itself from, the ground, rock, or tree-trunk on which it is rooted, may of course most naturally and accurately be called ‘*Aeria*,’ as it has long been popularly known in English by the name of Air-plant.

Thus we have one general name for all these creatures, ‘*Ophryd*’; and three family or group names, *Contorta*, *Satyrium*, and *Aeria*,—every one of these titles containing as much accurate fact about the thing named as I can possibly get packed into their syllables: and I will trouble my young readers with no more divisions of the order. And if their parents, tutors, or governors, after this fair warning, choose to make them learn, instead, the seventy-seven different names with which botanist-heraldries have beautifully ennobled the family,—all I can say is, let them at least begin by learning them themselves. They will be found in due order in pages 1084, 1085 of Loudon’s *Cyclopædia*.*

12. But now, farther: the student will observe that the name of the total order is Greek; while the three family ones are Latin, although the central one is originally Greek also.

I adopt this as far as possible for a law through my whole plant nomenclature.

13. Farther: the terminations of the Latin family names will be, for the most part, of the masculine, fem-

* I offer a sample of two dozen for good papas and mammas to begin with:—

Angracum.	Corallorrhiza.	Ornithidium.	Prescotia.
Anisopetalum.	Cryptarrhena.	Ornithocephalus.	Renanthera.
Brassavola.	Eulophia.	Platanthera.	Rodriguezia.
Brassia.	Gymnadenia.	Pleurothallis.	Stenorhyncus.
Caelogyne.	Microstylis.	Pogonia.	Trizeuxis.
Calopogon.	Octomeria.	Polystachya.	Xylobium.

inine, and nenter forms, us, a, um, with these following attached conditions.

(I.) Those terminating in 'us,' though often of feminine words, as the central Arbor, will indicate either real masculine strength (*quercus*, *laurus*), or conditions of dominant majesty (*cedrus*), of stubbornness and enduring force (*crataegus*), or of peasant-like commonalty and hardship (*juncus*); softened, as it may sometimes happen, into gentleness and beneficence (*thymus*). The occasional forms in 'er' and 'il' will have similar power (*acer*, *basil*).

(II.) Names with the feminine termination 'a,' if they are real names of girls, will always mean flowers that are perfectly pretty and perfectly good (*Lucia*, *Viola*, *Margarita*, *Clarissa*). Names terminating in 'a' which are not also accepted names of girls, may sometimes be none the less honourable, (*Primula*, *Campanula*,) but for the most part will signify either plants that are only good and worthy in a nursery sort of way, (*Salvia*,) or that are good without being pretty, (*Lavandula*,) or pretty without being good, (*Kalmia*). But no name terminating in 'a' will be attached to a plant that is neither good nor pretty.

(III.) The nenter names terminating in 'um' will always indicate some power either of active or suggestive evil, (*Conium*, *Solanum*, *Satyrrium*,) or a relation, more or less definite, to death; but this relation to death may sometimes be noble, or pathetic,

—"which to-day is, and to-morrow is cast into the oven,"—*Lilium*.

But the leading position of these neuters in the plant's double name must be noticed by students unacquainted with Latin, in order to distinguish them from plural genitives, which will always, of course, be the second word, (*Francesca Fontinum*, *Francesca of the Springs*.)

14. Names terminating in 'is' and 'e,' if definitely names of women, (*Iris*, *Amaryllis*, *Alcestis*, *Daphne*,) will always signify flowers of great beauty, and noble historic association. If not definitely names of women, they will yet indicate some specialty of sensitiveness, or association with legend (*Berberis*, *Clematis*). No neuters in 'e' will be admitted.

15. Participial terminations (*Impatiens*), with neuters in 'en' (*Cyclamen*), will always be descriptive of some special quality or form,—leaving it indeterminate if good or bad, until explained. It will be manifestly impossible to limit either these neuters, or the feminines in 'is' to Latin forms; but we shall always know by their termination that they cannot be generic names, if we are strict in forming these last on a given method.

16. How little method there is in our present formation of them, I am myself more and more surprised as I consider. A child is shown a rose, and told that he is to call every flower like that, 'Rosaceous';* he is next

* Compare Chapter V., § 7.

shown a lily, and told that he is to call every flower like that, 'Liliaceous';—so far well; but he is next shown a daisy, and is not at all allowed to call every flower like that, 'Daisaceous,' but he must call it, like the fifth order of architecture, 'Composite'; and being next shown a pink, he is not allowed to call other pinks 'Pinkaceous,' but 'Nut-leaved'; and being next shown a pease-blossom, he is not allowed to call other pease-blossoms 'Peasaceous,' but, in a brilliant burst of botanical imagination, he is incited to call it by two names instead of one, 'Butterfly-aceous' from its flower, and 'Pod-aceous' from its seed;—the inconsistency of the terms thus enforced upon him being perfected in their inaccuracy, for a daisy is not one whit more composite than Queen of the meadow, or Jura Jacinth;* and 'legumen' is not Latin for a pod, but 'siliqua,'—so that no good scholar could remember Virgil's 'siliqua quasante legumen,' without overthrowing all his Pisan nomenclature.

17. Farther. If we ground our names of the higher orders on the distinctive characters of *form* in plants, these are so many, and so subtle, that we are at once involved in more investigations than a young learner has ever time to follow successfully, and they must be at all times liable to dislocations and rearrangements on the discovery of any new link in the infinitely entangled

* "Jacinthus Juræ," changed from "Hyacinthus Comosus."

chain. But if we found our higher nomenclature at once on historic fact, and relative conditions of climate and character, rather than of form, we may at once distribute our flora into unalterable groups, to which we may add at our pleasure, but which will never need disturbance ; far less, reconstruction.

18. For instance,—and to begin,—it is an historical fact that for many centuries the English nation believed that the Founder of its religion, spiritually, by the mouth of the King who spake of all herbs, had likened himself to two flowers,—the Rose of Sharon, and Lily of the Valley. The fact of this belief is one of the most important in the history of England,—that is to say, of the mind or heart of England : and it is connected solemnly with the heart of Italy also, by the closing cantos of the *Paradiso*.

I think it well therefore that our two first generic, or at least commandant, names heading the out-laid and in-laid divisions of plants, should be of the rose and lily, with such meaning in them as may remind us of this fact in the history of human mind.

It is also historical that the personal appearing of this Master of our religion was spoken of by our chief religious teacher in these terms : “ The Grace of God, that bringeth salvation, hath appeared unto all men.” And it is a constant fact that this ‘ grace ’ or ‘ favor ’ of God is spoken of as “ giving us to eat of the Tree of Life.”

19. Now, comparing the botanical facts I have to express, with these historical ones, I find that the rose tribe

has been formed among flowers, not in distant and monstrous geologic æras, but in the human epoch ;—that its ‘ grace ’ or favor has been in all countries so felt as to cause its acceptance everywhere for the most perfect physical type of womanhood ;—and that the characteristic fruit of the tribe is so sweet, that it has become symbolic at once of the subtlest temptation, and the kindest ministry to the earthly passion of the human race. “ Comfort me with apples, for I am sick of love.”

20. Therefore I shall call the entire order of these flowers ‘ Charites,’ (Graces,) and they will be divided into these five genera, *Rosa*, *Persica*, *Pomum*, *Rubra*, and *Fragaria*. Which sequence of names I do not think the young learner will have difficulty in remembering ; nor in understanding why I distinguish the central group by the fruit instead of the flower. And if he once clearly master the structure and relations of these five genera, he will have no difficulty in attaching to them, in a satellitic or subordinate manner, such inferior groups as that of the Silver-weed, or the *Tormentilla* ; but all he will have to learn by heart and rote, will be these six names ; the Greek Master-name, *Charites*, and the five generic names, in each case belonging to plants, as he will soon find, of extreme personal interest to him.

21. I have used the word ‘ Order ’ as the name of our widest groups, in preference to ‘ Class,’ because these widest groups will not always include flowers like each other in form, or equal to each other in vegetative rank ;

but they will be 'Orders,' literally like those of any religious or chivalric association, having some common link rather intellectual than national,—the Charites, for instance, linked by their kindness,—the Oreiades, by their mountain seclusion, as Sisters of Charity or Monks of the Chartreuse, irrespective of ties of relationship. Then beneath these orders will come, what may be rightly called, either as above in Greek derivation, 'Genera,' or in Latin, 'Gentes,' for which, however, I choose the Latin word, because Genus is disagreeably liable to be confused on the ear with 'genins'; but Gens, never; and also 'nomen gentile' is a clearer and better expression than 'nomen generosum,' and I will not coin the barbarous one, 'genericum.' The name of the Gens, (as 'Lucia,') with an attached epithet, as 'Verna,' will, in most cases, be enough to characterize the individual flower; but if farther subdivision be necessary, the third order will be that of Families, indicated by a 'nomen familiare' added in the third place of nomenclature, as Lucia Verna,—Borealis; and no farther subdivision will ever be admitted. I avoid the word 'species'—originally a bad one, and lately vulgarized beyond endurance—altogether. And varieties belonging to narrow localities, or induced by horticulture, may be named as they please by the people living near the spot, or by the gardener who grows them; but will not be acknowledged by Proserpina. Nevertheless, the arbitrary reduction under Ordines, Gentes, and Familiæ,

is always to be remembered as one of massive practical convenience only ; and the more subtle arborescence of the infinitely varying structures may be followed, like a human genealogy, as far as we please, afterwards ; when once we have got our common plants clearly arranged and intelligibly named.

22. But now we find ourselves in the presence of a new difficulty, the greatest we have to deal with in the whole matter.

One new nomenclature, to be thoroughly good, must be acceptable to scholars in the five great languages, Greek, Latin, French, Italian, and English ; and it must be acceptable by them in teaching the native children of each country. I shall not be satisfied, unless I can feel that the little maids who gather their first violets under the Acropolis rock, may receive for them *Æschylean* words again with joy. I shall not be content, unless the mothers watching their children at play in the *Ceramicus* of Paris, under the scarred ruins of her *Kings' palace*, may yet teach them there to know the flowers which the *Maid of Orleans* gathered at *Domremy*. I shall not be satisfied unless every word I ask from the lips of the children of *Florence* and *Rome*, may enable them better to praise the flowers that are chosen by the hand of *Matilda*,* and bloom around the tomb of *Virgil*.

* " Cantando, e scegliendo fior di fiore

Onde era picta tutta la sua via."—*Purg.*, xxviii. 35.

23. Now in this first example of nomenclature, the Master-name, being *pure* Greek, may easily be accepted by Greek children, remembering that certain also of their own poets, if they did not call the flower a Grace itself, at least thought of it as giving gladness to the Three in their dances.* But for French children the word ‘Grâce’ has been doubly and trebly corrupted; first, by entirely false theological scholarship, mistaking the ‘Favor’ or Grace done by God to good men, for the ‘Misericordia,’ or mercy, shown by Him to bad ones; and so, in practical life, finally substituting ‘Grâce’ as a word of extreme and mortal prayer, for ‘Merci,’ and of late using ‘Merci’ in a totally ridiculous and perverted power, for the giving of thanks (or refusal of offered good): while the literally derived word ‘Charite’ has become, in the modern mind, a gift, whether from God or man, only to the wretched, never to the happy: and lastly, ‘Grâce’ in its physical sense has been perverted, by their social vulgarity, into an idea, whether with respect to form or motion, commending itself rather to the ballet-master than either to the painter or the priest.

For these reasons, the Master name of this family, for my French pupils, must be simply ‘Rhodiades,’ which will bring, for them, the entire group of names into easily remembered symmetry; and the English form of

* “καὶ θεοῖσι τερπνύ.”

the same name, Rhodiad, is to be used by English scholars also for all tribes of this group except the five principal ones.

24. Farther, in every gens of plants, one will be chosen as the representative, which, if any, will be that examined and described in the course of this work, if I have opportunity of doing so.

This representative flower will always be a wild one, and of the simplest form which completely expresses the character of the plant ; existing divinely and unchangeably from age to age, ungrieved by man's neglect, and inflexible by his power.

And this divine character will be expressed by the epithet ' Sacred,' taking the sense in which we attach it to a dominant and christened majesty, when it belongs to the central type of any forceful order ;—' *Quercus sacra*,' ' *Laurus sacra*,' etc.,—the word ' *Benedicta*,' or ' *Benedictus*,' being used instead, if the plant be too humble to bear, without some discrepancy and unbecomingness, the higher title ; as ' *Carduus Benedictus*,' Holy Thistle.

25. Among the gentes of flowers bearing girls' names, the dominant one will be simply called the Queen, ' *Rose Regina*,' ' *Rose the Queen* ' (the English wild rose) ; ' *Clarissa Regina*,' ' *Clarissa the Queen* ' (Mountain Pink) ; ' *Lucia Regina*,' ' *Lucy the Queen* ' (Spring Gentian), or in simpler English, ' *Lucy of Teesdale*,' as ' *Harry of Monmouth*.' The ruling flowers of groups

which bear names not yet accepted for names of girls, will be called simply 'Domina,' or shortly 'Donna.' 'Rubra domina' (wild raspberry): the wild strawberry, because of her use in heraldry, will bear a name of her own, exceptional, 'Cora coronalis.'

26. These main points being understood, and concessions made, we may first arrange the greater orders of land plants in a group of twelve, easily remembered, and with very little forcing. There must be *some* forcing always to get things into quite easily tenable form, for Nature always has her ins and outs. But it is curious how fitly and frequently the number of twelve may be used for *memoria technica*; and in this instance the Greek derivative names fall at once into harmony with the most beautiful parts of Greek mythology, leading on to early Christian tradition.

27. Their series will be, therefore, as follows: the principal subordinate groups being at once placed under each of the great ones. The reasons for occasional appearance of inconsistency will be afterwards explained, and the English and French forms given in each case are the terms which would be used in answering the rapid question, 'Of what order is this flower?' the answer being, It is a 'Cyllenid,' a 'Pleiad,' or a 'Vestal,' as one would answer of a person, he is a Knight of St. John or Monk of St. Benedict; while to the question, of what gens, we answer, a Stella or an Erica, as one would answer of a person, a Stuart or Plantagenet.

I. CHARITES.

ENG. CHARIS. FR. RHODIADE.

Rosa. Persica. Pomum. Rubra. Fragaria.

II. URANIDES.

ENG. URANID. FR. URANIDE.

Lucia. Campanula. Convoluta.

III. CYLLENIDES.

ENG. CYLLENID. FR. NEPHELIDE.

Stella. Francesca. Primula.

IV. OREIADES.

ENG. OREIAD. FR. OREADE.

Erica. Myrtilla. Aurora.

V. PLEIADES.

ENG. PLEIAD. FR. PLEIADE.

Silvia. Anemone.

VI. ARTEMIDES.

ENG. ARTEMID. FR. ARTEMIDE.

Clarissa. Lychnis. Scintilla. Mica.

VII. VESTALES.

ENG. VESTAL. FR. VESTALE.

Mentha. Melitta. Basil. Salvia. Lavandula. Thymus.

VIII. CYTHERIDES.

ENG. CYTHERID. FR. CYTHERIDE.

Viola. Veronica. Giulietta.

IX. HELIADES.

ENG. ALCESTID. FR. HELIADE.

Clytia. Margarita. Alcestis. Falconia. Carduus.

X. DELPHIDES.

ENG. DELPHID. FR. DELPHIDE.

Laurus. Granata. Myrtus.

II. HESPERIDES.

ENG. HESPERID. FR. HESPERIDE.

Aurantia. Aglee.

XII. ATHENAIDES.

ENG. ATHENAID. FR. ATHENAIDE.

Olea. Fraxinus.

I will shortly note the changes of name in their twelve orders, and the reasons for them.

I. CHARITES.—The only change made in the nomenclature of this order is the slight one of ‘rubra’ for ‘rubus’: partly to express true sisterhood with the other Charites; partly to enforce the idea of redness, as characteristic of the race, both in the lovely purple and russet of their winter leafage, and in the exquisite bloom of scarlet on the stems in strong young shoots. They have every right to be placed among the Charites, first because the raspberry is really a more important fruit in domestic economy than the strawberry; and, secondly, because the wild bramble is often in its wandering sprays even more graceful than the rose; and in blossom and

fruit the best autumnal gift that English Nature has appointed for her village children.

II. URANIDES.—Not merely because they are all of the color of the sky, but also sacred to Urania in their divine purity. ‘Convoluta’ instead of ‘convolvulus,’ chiefly for the sake of euphony ; but also because pervinca is to be included in this group.

III. CYLLENIDES. — Named from Mount Cyllene in Arcadia, because the three races included in the order alike delight in rocky ground, and in the cold or moist air of mountain-clouds.

IV. OREIADES.—Described in next chapter.

V. PLEIADES.—From the habit of the flowers belonging to this order to get into bright local clusters. Silvia, for the wood-sorrel, will I hope be an acceptable change to my girl-readers.

VI. ARTEMIDES. — Dedicate to Artemis for their expression of energy, no less than purity. This character was rightly felt in them by whoever gave the name ‘Dianthus’ to their leading race ; a name which I should have retained if it had not been bad Greek. I wish them, by their name ‘Clarissa’ to recall the memory of St. Clare, as ‘Francesca’ that of St. Francis.* The

* The four races of this order are more naturally distinct than botanists have recognized. In Clarissa, the petal is cloven into a fringe at the outer edge ; in Lychnis, the petal is terminated in two rounded lobes and the fringe withdrawn to the top of the limb ; in Scintilla, the petal is divided into two *sharp* lobes, without any fringe

'issa,' not without honour to the greatest of our English moral story-tellers, is added for the practical reason, that I think the sound will fasten in the minds of children the essential characteristic of the race, the cutting of the outer edge of the petal as if with scissors.

VII. VESTALES.—I allow this Latin form, because Hestiades would have been confused with Heliades. The order is named 'of the hearth,' from its manifold domestic use, and modest blossoming.

VIII. CYTHERIDES.—Dedicate to Venus, but in all purity and peace of thought. Giulietta, for the coarse, and more than ordinarily false, Polygala.

IX. HELIADES.—The sun - flowers.* In English, Alceetid, in honour to Chaucer and the Daisy.

X. DELPHIDES.—Sacred to Apollo. Granata, changed from Punica, in honor to Granada and the Moors.

XI. HESPERIDES.—Already a name given to the order.

of the limb; and in Mica, the minute and scarcely visible flowers have simple and far separate petals. The confusion of these four great natural races under the vulgar or accidental botanical names of spittle-plant, shore-plant, sand-plant, etc., has become entirely intolerable by any rational student; but the names 'Scintilla,' substituted for *Stellaria*, and 'Mica' for the utterly ridiculous and probably untrue *Sagina*, connect themselves naturally with *Lychnis*, in expression of the luminous power of the white and sparkling blossoms.

* *Clytia* will include all the true sun-flowers, and *Falconia* the hawkweeds; but I have not yet completed the analysis of this vast and complex order, so as to determine the limits of *Margarita* and *Alcestis*.

Aegle, prettier and more classic than Limonia, includes the idea of brightness in the blossom.

XII. *ATHENAIDES*.—I take *Fraxinus* into this group, because the mountain ash, in its hawthorn-scented flower, scarletest of berries, and exquisitely formed and finished leafage, belongs wholly to the floral decoration of our native rocks, and is associated with their human interests, though lightly, not less spiritually, than the olive with the mind of Greece.

28. The remaining groups are in great part natural ; but I separate for subsequent study five orders of supreme domestic utility, the Mallows, Currants, Pease,* Cresses, and Cranesbills, from those which, either in fruit or blossom, are for finer pleasure or higher beauty. I think it will be generally interesting for children to learn those five names as an easy lesson, and gradually discover, wondering, the world that they include. I will give their terminology at length, separately.

29. One cannot, in all groups, have all the divisions of equal importance ; the Mallows are only placed with the other four for their great value in decoration of cottage gardens in autumn : and their softly healing qual-

* The reader must observe that the positions given in this more developed system to any flower do not interfere with arrangements either formerly or hereafter given for *memoria technica*. The name of the pea, for instance (*alata*), is to be learned first among the twelve cinquefoils, p. 214, above ; then transferred to its botanical place.

ities as a tribe. They will mentally connect the whole useful group with the three great *Æsculapiadæ*, *Cinchona*, *Coffea*, and *Camellia*.

30. Taking next the water-plants, crowned in the *DROSIDÆ*, which include the five great families, *Juncus*, *Jacinthus*, *Amaryllis*, *Iris*, and *Lilium*, and are masculine in their Greek name because their two first groups, *Juncus* and *Jacinthus*, are masculine, I gather together the three orders of *TRITONIDES*, which are notably trefoil ; the *NAIADES*, notably quatrefoil, but for which I keep their present pretty name ; and the *BATRACHIDES*,* notably cinqfoil, for which I keep their present ugly one, only changing it from Latin into Greek.

31. I am not sure of being forgiven so readily for putting the Grasses, Sedges, Mosses, and Liehens together, under the great general head of *Demetridæ*. But it seems to me the mosses and liehens belong no less definitely to *Demeter*, in being the first gatherers of earth on rock, and the first coverers of its sterile surface, than the grass which at last prepares it to the foot and to the food of man. And with the mosses I shall take all the especially moss-plants which otherwise are homeless or companionless, *Drosera*, and the like, and as a connecting link with the flowers belonging to the Dark

* The amphibious habit of this race is to me of more importance than its outlaid structure.

Kora, the two strange orders of the Ophryds and Agarics.

32. Lastly will come the orders of flowers which may be thought of as belonging for the most part to the Dark Kora of the lower world,—having at least the power of death, if not its terror, given them, together with offices of comfort and healing in sleep, or of strengthening, if not too prolonged, action on the nervous power of life. Of these, the first will be the DIONYSIDÆ,—Hedera, Vitis, Liana ; then the DRACONIDÆ, — Atropa, Digitalis, Linaria ; and, lastly, the MOIRIDÆ,—Conium, Papaver, Solanum, Arum, and Nerium.

33. As I see this scheme now drawn out, simple as it is, the scope of it seems not only far too great for adequate completion by my own labour, but larger than the time likely to be given to botany by average scholars would enable them intelligently to grasp : and yet it includes, I suppose, not the tenth part of the varieties of plants respecting which, in competitive examination, a student of physical science is now expected to know, or at least assert on hearsay, *something*.

So far as I have influence with the young, myself, I would pray them to be assured that it is better to know the habits of one plant than the names of a thousand ; and wiser to be happily familiar with those that grow in the nearest field, than arduously cognisant of all that plume the isles of the Pacific, or illumine the Mountains of the Moon.

Nevertheless, I believe that when once the general form of this system in Proserpina has been well learned, much other knowledge may be easily attached to it, or sheltered under the eaves of it : and in its own development, I believe everything may be included that the student will find useful, or may wisely desire to investigate, of properly European botany. But I am convinced that the best results of his study will be reached by a resolved adherence to extreme simplicity of primal idea, and primal nomenclature.

34. I do not think the need of revisal of our present scientific classification could be more clearly demonstrated than by the fact that laurels and roses are confused, even by Dr. Lindley, in the mind of his feminine readers ; the English word laurel, in the index to his first volume of Ladies' Botany, referring them to the cherries, under which the common laurel is placed as ' *Prunus Laurocerasus*,' while the true laurel, ' *Laurus nobilis*,' must be found in the index of the second volume, under the Latin form ' *Laurus*.'

This accident, however, illustrates another, and a most important point to be remembered, in all arrangements whether of plants, minerals, or animals. No single classification can possibly be perfect, or anything *like* perfect. It must be, at its best, a ground, or *warp* of arrangement only, through which, or over which, the cross threads of another,—yes, and of many others,—must be woven in our minds. Thus the almond, though in

the form and colour of its flower, and method of its fruit, rightly associated with the roses, yet by the richness and sweetness of its kernel must be held mentally connected with all plants that bear nuts. These assuredly must have something in their structure common, justifying their being gathered into a conceived or conceivable group of 'Nuciferae,' in which the almond, hazel, walnut, cocoa-nut, and such others would be considered as having relationship, at least in their power of secreting a crisp and sweet substance which is not wood, nor bark, nor pulp, nor seed-pabulum reducible to softness by boiling ;—but quite separate substance, for which I do not know that there at present exists any botanical name,—of which, hitherto, I find no general account, and can only myself give so much, on reflection, as that it is crisp and close in texture, and always contains some kind of oil or milk.

35. Again, suppose the arrangement of plants could, with respect to their flowers and fruits, be made approximately complete, they must instantly be broken and reformed by comparison of their stems and leaves. The three *creeping* families of the Charites,—*Rosa*, *Rubra*, and *Fragaria*,—must then be frankly separated from the elastic *Persica* and knotty *Pomum* ; of which one wild and lovely species, the hawthorn, is no less notable for the massive accumulation of wood in the stubborn stem of it, than the wild rose for her lovely power of wreathing her garlands at pleasure wherever they are

fairest, the stem following them and sustaining, where they will.

36. Thus, as we examine successively each part of any plant, new sisterhoods, and unthought-of fellowships, will be found between the most distant orders ; and ravines of unexpected separation open between those otherwise closely allied. Few botanical characters are more definite than the leaf structure illustrated in Plate VI., which has given to one group of the Drosidæ the descriptive name of *Ensatæ*, (see above, Chapter IX., § 11,) but this conformation would not be wisely permitted to interfere in the least with the arrangement founded on the much more decisive floral aspects of the Iris and Lily. So, in the fifth volume of ‘Modern Painters,’ the sword-like, or rather rapier-like, leaves of the pine are opposed, for the sake of more vivid realization, to the shield-like leaves of the greater number of inland trees ; but it would be absurd to allow this difference any share in botanical arrangement,—else we should find ourselves thrown into sudden discomfiture by the wide-waving and opening foliage of the palms and ferns.

37. But through all the defeats by which insolent endeavors to sum the orders of Creation must be reprovèd, and in the midst of the successes by which patient insight will be surprised, the fact of the *confirmation* of species in plants and animals must remain always a miraculous one. What outstretched sign of constant Omnipotence can be more awful, than that the susceptibility to

external influences, with the reciprocal power of transformation, in the organs of the plant ; and the infinite powers of moral training and mental conception over the nativity of animals, should be so restrained within impassable limits, and by inconceivable laws, that from generation to generation, under all the clouds and revolutions of heaven with its stars, and among all the calamities and convulsions of the Earth with her passions, the numbers and the names of her Kindred may still be counted for her in unfailing truth ;—still the fifth sweet leaf unfold for the Rose, and the sixth spring for the Lily ; and yet the wolf rave taneless round the folds of the pastoral mountains, and yet the tiger flame through the forests of the night.

CHAPTER XII.

CORA AND KRONOS.

I. OF all the lovely wild plants—and few, mountain-bred, in Britain, are other than lovely,—that fill the clefts and crest the ridges of my Brantwood rock, the dearest to me, by far, are the clusters of whortleberry which divide possession of the lower slopes with the wood hyacinth and pervenche. They are personally and specially dear to me for their association in my mind with the woods of Montanvert ; but the plant itself, irrespective of all accidental feeling, is indeed so beautiful in all its ways—so delicately strong in the spring of its leafage, so modestly wonderful in the formation of its fruit, and so pure in choice of its haunts, not capriciously or unfamiliarly, but growing in luxuriance through all the healthiest and sweetest seclusion of mountain territory throughout Europe,—that I think I may without any sharp remonstrance be permitted to express for this once only, personal feeling in my nomenclature, calling it in Latin ‘*Myrtilla Cara*,’ and in French ‘*Myrtille Chérie*,’ but retaining for it in English its simply classic name, ‘Blue Whortle.’

2. It is the most common representative of the group of Myrtillæ, which, on reference to our classification, will be found central between the Ericæ and Auroræ. The distinctions between these three families may be easily remembered, and had better be learned before going farther ; but first let us note their fellowship. They are all Oreiades, mountain plants ; in specialty, they are all strong in stem, low in stature, and the Ericæ and Auroræ glorious in the flush of their infinitely exulting flowers, (" the rapture of the heath"—above spoken of, p. 96.) But all the essential loveliness of the Myrtillæ is in their leaves and fruit : the first always exquisitely finished and grouped like the most precious decorative work of sacred painting ; the second, red or purple, like beads of coral or amethyst. Their minute flowers have rarely any general part or power in the colors of mountain ground ; but, examined closely, they are one of the chief joys of the traveller's rest among the Alps ; and full of exquisiteness unspeakable, in their several bearings and mien of blossom, so to speak. Plate VIII. represents, however feebly, the proud bending back of her head by Myrtilla Regina : * an action as beautiful in *her* as it is terrible in the Kingly Serpent of Egypt.

3. The formal differences between these three families are trenchant and easily remembered. The Ericæ

* " Arctostaphylos Alpina," I believe ; but scarcely recognize the flower in my botanical books.

are all quatrefoils, and quatrefoils of the most studied and accomplished symmetry ; and they bear no berries, but only dry seeds. The Myrtillæ and Auroræ are both Cinqfoil ; but the Myrtillæ are symmetrical in their blossom, and the Auroræ unsymmetrical. Farther, the Myrtillæ are not absolutely determinate in the number of their foils, (this being essentially a characteristic of flowers exposed to much hardship,) and are thus sometimes quatrefoil, in sympathy with the Ericæ. But the Auroræ are strictly cinqfoil. These last are the only European form of a larger group, well named ‘ Azalea ’ from the Greek ἀζα, dryness, and its adjective ἀζαλέα, dry or parched ; and *this* name must be kept for the world-wide group, (including under it Rhododendron, but not Kalmia,) because there is an under-meaning in the word Aza, enabling it to be applied to the substance of dry earth, and indicating one of the great functions of the Oreiades, in common with the mosses,—the collection of earth upon rocks.

4. Neither the Ericæ, as I have just said, nor Auroræ bear useful fruit ; and the Ericæ are named from their consequent worthlessness in the eyes of the Greek farmer ; they were the plants he ‘ tore up ’ for his bed, or signal-fire, his word for them including a farther sense of crushing or bruising into a heap. The Westmoreland shepherds now, alas ! burn them remorselessly on the ground, (and a year since had nearly set the copse of Brantwood on fire just above the house.) The sense of

parched and fruitless existence is given to the heaths, with beautiful application of the context, in our English translation of Jeremiah xvii. 6 ; but I find the plant there named is, in the Septuagint, Wild Tamarisk ; the mountains of Palestine being, I suppose, in that latitude, too low for heath, unless in the Lebanon.

5. But I have drawn the reader's thoughts to this great race of the Oreiades at present, because they place for us in the clearest light a question which I have finally to answer before closing the first volume of Proserpina ; namely, what is the real difference between the three ranks of Vegetative Humility, and Noblesse—the Herb, the Shrub, and the Tree ?

6. Between the herb, which perishes annually, and the plants which construct year after year an increasing stem, there is, of course, no difficulty of discernment ; but between the plants which, like these Oreiades, construct for themselves richest intricacy of supporting stem, yet scarcely rise a fathom's height above the earth they gather and adorn,—between these, and the trees that lift cathedral aisles of colossal shade on Andes and Lebanon,—where is the limit of kind to be truly set ?

7. We have the three orders given, as no botanist could, in twelve lines by Milton :—

“ Then herbs of every leaf, that sudden flow'r'd
Op'ning their various colours, and made gay
Her bosom smelling sweet ; and, these scarce blown,
Forth flourish'd thick the clust'ring vine, forth crept

The swelling gourd, up stood the corny reed
 Embattel'd in her field ; and th' *humble shrub*,
And bush with frizzled hair implicit : last
 Rose, as in dance, the stately trees, and spread
 Their branches hung with copious fruits, or gemm'd
 Their blossoms ; with high woods the hills were crown'd ;
 With tufts the valleys and each fountain side ;
 With borders long the rivers."

Only to learn, and be made to understand, these twelve lines thoroughly would teach a youth more of true botany than an entire Cyclopædia of modern nomenclature and description : they are, like all Milton's work, perfect in accuracy of epithet, while consummate in concentration. Exquisite in touch, as infinite in breadth, they gather into their unbroken clause of melodious compass the conception at once of the Columbian prairie, the English cornfield, the Syrian vineyard, and the Indian grove. But even Milton has left untold, and for the instant perhaps unthought of, the most solemn difference of rank between the low and lofty trees, not in magnitude only, nor in grace, but in duration.

8. Yet let us pause before passing to this greater subject, to dwell more closely on what he has told us so clearly,—the difference in Grace, namely, between the trees that rise 'as in dance,' and 'the bush with frizzled hair.' For the bush form is essentially one taken by vegetation in some kind of distress ; scorched by heat, discouraged by darkness, or bitten by frost ; it is the form in which isolated knots of earnest plant life stay

the flux of fiery sands, bind the rents of tottering crags, purge the stagnant air of cave or chasm, and fringe with sudden hues of un hoped spring the Arctic edge of retreating desolation.

On the other hand, the trees which, as in sacred dance, make the borders of the rivers glad with their procession, and the mountain ridges statelier with their pride, are all expressions of the vegetative power in its accomplished felicities ; gathering themselves into graceful companionship with the fairest arts and serenest life of man ; and providing not only the sustenance and the instruments, but also the lessons and the delights, of that life, in perfectness of order, and unblighted fruition of season and time.

9. 'Intercitura'—yet these not to-day, nor to-morrow, nor with the decline of the summer's sun. We describe a plant as small or great ; and think we have given account enough of its nature and being. But the chief question for the plant, as for the human creature, is the Number of its days ; for to the tree, as to its master, the words are forever true—"As thy Day is, so shall thy Strength be."

10. I am astonished hourly, more and more, at the apathy and stupidity which have prevented me hitherto from learning the most simple facts at the base of this question ! Here is this myrtle bush in my hand—its cluster of some fifteen or twenty delicate green branches knitting themselves downwards into the stubborn brown

of a stem on which my knife makes little impression. I have not the slightest idea how old it is, still less how old it might one day have been if I had not gathered it ; and, less than the least, what hinders it from becoming as old as it likes ! What doom is there over these bright green sprays, that they may never win to any height or space of verdure, nor persist beyond their narrow scope of years ?

11. And the more I think the more I bewilder myself ; for these bushes, which are pruned and clipped by the deathless Gardener into these lowly thickets of bloom, do not strew the ground with fallen branches and faded clippings in any wise,—it is the pining unbrage of the patriarchal trees that tinges the ground and betrays the foot beneath them : but, under the heather and the Alpine rose.—Well, what *is* under them, then ? I never saw, nor thought of looking,—will look presently under my own bosquets and beds of lingering heather-blossom : beds indeed they were only a month since, a foot deep in flowers, and close in tufted cushions, and the mountain air that floated over them rich in honey like a draught of metheglin.

12. Not clipped, nor pruned, I think, after all,—nor dwarfed in the gardener's sense ; but pausing in perpetual youth and strength, ordained out of their lips of roseate infancy. Rose-trees — the botanists have falsely called the proudest of them ; yet not trees in any wise, they, nor doomed to know the edge of axe at their

roots, nor the hoary waste of time, or searing thunder-stroke, on sapless branches. Continual morning for them, and *in* them ; they themselves an Aurora, purple and cloudless, stayed on all the happy hills. That shall be our name for them, in the flushed Phœnician colour of their height, in calm or tempest of the heavenly sea ; how much holier than the depth of the Tyrian ! And the queen of them on our own Alps shall be ‘ Aurora Alpinum.’ *

13. There is one word in the Miltonian painting of them which I must lean on specially ; for the accurate English of it hides deep morality no less than botany. ‘ With hair *implicit*.’ The interweaving of complex band, which knits the masses of heath or of Alpine rose into their dense tufts and spheres of flower, is to be noted both in these, and in stem structure of a higher order like that of the stone pine, for an expression of the instinct of the plant gathering itself into protective unity, whether against cold or heat, while the forms of the trees which have no hardship to sustain are uniformly based on the effort of each spray to *separate* itself from its fellows to the utmost, and obtain around its own leaves the utmost space of air.

In vulgar modern English, the term ‘ implicit ’ used of Trust or Faith, has come to signify only its serenity. But the Miltonian word gives the *reason* of serenity :

* ‘ Aurora Regina,’ changed from *Rhododendron Ferrugineum*.

the root and branch intricacy of closest knowledge and fellowship.

14. I have said that Milton has told us more in these few lines than any botanist could. I will prove my saying by placing in comparison with them two passages of description by the most imaginative and generally well-trained scientific man since Linnæus—Humboldt—which, containing much that is at this moment of special use to us, are curious also in the confusion even of the two orders of annual and perennial plants, and show, therefore, the extreme need of most careful initial work in this distinction of the reign of Cora from that of Kronos.

“The disk of the setting sun appeared like a globe of fire suspended over the savannah ; and its last rays, as they swept the earth, illumined the extremities of the grass, strongly agitated by the evening breeze. In the low and humid places of the equinoxial zone, even when the gramineous plants and reeds present the aspect of a meadow, of turf, a rich decoration of the picture is usually wanting. I mean that variety of wild flowers which, scarcely rising above the grass, seem to lie upon a smooth bed of verdure. Between the tropics, the strength and luxury of vegetation give such a development to plants, that the smallest of the dicotyledonous family become shrubs.* It would seem as if the liliace-

* I do not see what this can mean. Primroses and cowslips can't become shrubs ; nor can violets, nor daisies, nor any other of our pet meadow flowers.

ous plants, mingled with the gramina, assumed the place of the flowers of our meadows. Their form is indeed striking; they dazzle by the variety and splendor of their colours; but, too high above the soil, they disturb that harmonious relation which exists among the plants that compose our meadows and our turf. Nature, in her beneficence, has given the landscape under every zone its peculiar type of beauty.

“After proceeding four hours across the savannahs, we entered into a little wood composed of shrubs and small trees, which is called El Pejual; no doubt because of the great abundance of the ‘Pejoa’ (*Gaultheria odorata*,) a plant with very odoriferous leaves. The steepness of the mountain became less considerable, and we felt an indescribable pleasure in examining the plants of this region. Nowhere, perhaps, can be found collected together in so small a space of ground, productions so beautiful, and so remarkable in regard to the geography of plants. At the height of a thousand toises, the lofty savannahs of the hills terminate in a zone of shrubs, which by their appearance, their tortuous branches, their stiff leaves, and the dimensions and beauty of their purple flowers, remind us of what is called in the Cordilleras of the Andes the vegetation of the *paramos** and the *punas*. We find there the fam-

* ‘Deserts.’ *Punas* is not in my Spanish dictionary, and the reference to a former note is wrong in my edition of Humboldt, vol. iii., p. 490.

ily of the Alpine rhododendrons, the thibandias, the andromedas, the vacciniums, and those befarias* with resinous leaves, which we have several times compared to the rhododendron of our European Alps.

“ Even when nature does not produce the same species in analogous climates, either in the plains of isothermal parallels, or on table-lands the temperature of which resembles that of places nearer the poles, we still remark a striking resemblance of appearance and physiognomy in the vegetation of the most distant countries. This phenomenon is one of the most curious in the history of organic forms. I say the history ; for in vain would reason forbid man to form hypotheses on the origin of things : he is not the less tormented with these insoluble problems of the distribution of beings.”

15. Insoluble—yes, assuredly, poor little beaten phantasms of palpitating clay that we are—and who asked us to solve it ? Even this Humboldt, quiet-hearted and modest watcher of the ways of Heaven, in the real make of him, came at last to be so far puffed up by his vain science in declining years that he must needs write a Kosmos of things in the Universe, forsooth, as if he knew all about them ! when he was not able meanwhile, (and does not seem even to have desired the ability,) to put the slightest Kosmos into his own ‘ Personal Narrative ’ ; but leaves one to gather what one wants out of

* “ The Alpine rose of equinoctial America,” p. 453.

its wild growth ; or rather, to wash or winnow what may be useful out of its débris, without any vestige either of reference or index ; and I must look for these fragmentary sketches of heath and grass through chapter after chapter about the races of the Indian and religion of the Spaniard,—these also of great intrinsic value, but made useless to the general reader by interspersed experiment on the drifts of the wind and the depths of the sea.

16. But one more fragment out of a note (vol. iii., p. 494) I must give, with reference to an order of the *Rhododendrons* as yet wholly unknown to me.

“ The name of vine tree, ‘ *uvas camaronas* ’ (Shrimp grapes ?) is given in the Andes to plants of the genus *Thibaudia* on account of their *large succulent fruit*. Thus the ancient botanists give the name of Bear’s vine, ‘ *Uva Ursi*,’ and vine of Mount Ida, ‘ *Vitis Idea*,’ to an *Arbutus* and *Myrtillus* which belong, like the *Thibaudiæ*, to the family of the *Ericineæ*. ”

Now, though I have one entire bookcase and half of another, and a large cabinet besides, or about fifteen feet square of books on botany beside me here, and a quantity more at Oxford, I have no means whatever, in all the heap, of finding out what a *Thibaudia* is like. Loudon’s *Cyclopædia*, the only general book I have, tells me only that it will grow well in camellia houses, that its flowers develope at Christmas, and that they are beautifully varied like a fritillary : whereupon I am very anxious to see them, and taste their fruit, and be able to

tell my pupils something intelligible of them,—a new order, as it seems to me, among my Oreiades. But for the present I can make no room for them, and must be content, for England and the Alps, with my single class, Myrtilla, including all the fruit-bearing and (more or less) myrtle-leaved kinds ; and Azalea for the fruitless flushing of the loftier tribes ; taking the special name ‘Aurora’ for the red and purple ones of Europe, and resigning the already accepted ‘Rhodora’ to those of the Andes and Himalaya.

17. Of which also, with help of earnest Indian botanists, I hope nevertheless to add some little history to that of our own Oreiades ; but shall set myself on the most familiar of them first, as I partly hinted in taking for the frontispiece of this volume two unchecked shoots of our commonest heath, in their state of full lustre and decline. And now I must go out and see and think—and for the first time in my life—what becomes of all these fallen blossoms, and where my own mountain Cora hides herself in winter ; and where her sweet body is laid in its death.

Think of it with me, for a moment before I go. That harvest of amethyst bells, over all Scottish and Irish and Cumberland hill and moorland ; what substance is there in it, yearly gathered out of the mountain winds,—stayed there, as if the morning and evening clouds had been caught out of them and woven into flowers ; ‘Ropes of sea-sand’—but that is child’s magic

merely, compared to the weaving of the Heath out of the cloud. And once woven, how much of it is forever worn by the Earth? What weight of that transparent tissue, half crystal and half comb of honey, lies strewn every year dead under the snow?

I must go and look, and can write no more to-day; nor to-morrow neither. I must gather slowly what I see, and remember; and meantime leaving, to be dealt with afterwards, the difficult and quite separate question of the production of *wood*, I will close this first volume of Proserpina with some necessary statements respecting the operations, serviceable to other creatures than themselves, in which the lives of the noblest plants are ended: honourable in this service equally, though evanescent, some,—in the passing of a breeze—or the dying of a day;—and patient some, of storm and time, serene in fruitful sanctity, through all the uncounted ages which Man has polluted with his tears.

CHAPTER XIII.

THE SEED AND HUSK.

1. Not the least sorrowful, nor least absurd of the confusions brought on us by unscholarly botanists, blundering into foreign languages, when they do not know how to use their own, is that which has followed on their practice of calling the seed-vessels of flowers ‘egg-vessels,’ * in Latin ; thus involving total loss of the power of the good old English word ‘husk,’ and the good old French one, ‘cosse.’ For all the treasuries of plants (see Chapter IV., § 17) may be best conceived, and described, generally, as consisting of ‘seed’ and ‘husk,’—for the most part two or more seeds, in a husk composed of two or more parts, as pease in their shell, pips in an orange, or kernels in a walnut ; but whatever their number, or the method of their enclosure, let the student keep clear in his mind, for the base of all study of fructification, the broad distinction between the seed, as one thing, and the husk as another : the seed, essential to the continuance of the plant’s race ; and the husk,

* More literally “ persons to whom the care of eggs is entrusted.”

adapted, primarily, to its guard and dissemination ; but secondarily, to quite other and far more important functions.

2. For on this distinction follows another practical one of great importance. A seed may serve, and many do mightily serve, for the food of man, when boiled, crushed, or otherwise industriously prepared by man himself, for his mere *sustenance*. But the *husk* of the seed is prepared in many cases for the delight of his eyes, and the pleasure of his palate, by Nature herself, and is then called a 'fruit.'

3. The varieties of structure both in seed and husk, and yet more, the manner in which the one is contained, and distributed by, the other, are infinite ; and in some cases the husk is apparently wanting, or takes some unrecognizable form. But in far the plurality of instances the two parts of the plant's treasury are easily distinguishable, and must be separately studied, whatever their apparent closeness of relation, or, (as in all natural things,) the equivocation sometimes taking place between the one and the other. To me, the especially curious point in this matter is that, while I find the most elaborate accounts given by botanists of the stages of growth in each of these parts of the treasury, they never say of what use the guardian is to the guarded part, irrespective of its service to man. The mechanical action of the husk in containing and scattering the seeds, they indeed often notice and insist on ; but they do not tell

us of what, if any, nutritious or fostering use the rind is to a chestnut, or an orange's pulp to its pips, or a peach's juice to its stone.

4. Putting aside this deeper question for the moment, let us make sure we understand well, and define safely, the separate parts themselves. A seed consists essentially of a store, or sack, containing substance to nourish a germ of life, which is surrounded by such substance, and in the process of growth is first fed by it. The germ of life itself rises into two portions, and not more than two, in the seeds of two-leaved plants ; but this symmetrical dualism must not be allowed to confuse the student's conception, of the *three* organically separate parts,—the tough skin of a bean, for instance ; the softer contents of it which we boil to eat ; and the small germ from which the root springs when it is sown. A bean is the best type of the whole structure. An almond out of its shell, a peach-kernel, and an apple-pip are also clear and perfect, though varied types.

5. The husk, or seed-vessel, is seen in perfect simplicity of type in the pod of a bean, or the globe of a poppy. There are, I believe, flowers in which it is absent or imperfect ; and when it contains only one seed, it may be so small and closely united with the seed it contains, that both will be naturally thought of as one thing only. Thus, in a dandelion, the little brown grains, which may be blown away, each with its silken parachute, are every one of them a complete husk and

seed together. But the majority of instances (and those of plants the most serviceable to man) in which the seed-vessel has entirely a separate structure and mechanical power, justify us in giving it the normal term 'husk,' as the most widely applicable and intelligible.

6. The change of green, hard, and tasteless vegetable substance into beautifully coloured, soft, and delicious substance, which produces what we call a fruit, is, in most cases, of the husk only ; in others, of the part of the stalk which immediately sustains the seed ; and in a very few instances, not properly a change, but a distinct formation, of fruity substance between the husk and seed. Normally, however, the husk, like the seed, consists always of three parts ; it has an outer skin, a central substance of peculiar nature, and an inner skin, which holds the seed. The main difficulty, in describing or thinking of the completely ripened product of any plant, is to discern clearly which is the inner skin of the husk, and which the outer skin of the seed. The peach is in this respect the best general type,—the woolly skin being the outer one of the husk ; the part we eat, the central substance of the husk ; and the hard shell of the stone, the inner skin of the husk. The bitter kernel within is the seed.

7. In this case, and in the plum and cherry, the two parts under present examination—husk and seed—separate naturally ; the fruity part, which is the body of the husk, adhering firmly to the shell, which is its inner

coat. But in the walnut and almond, the two outer parts of the husk separate from the interior one, which becomes an apparently independent 'shell.' So that when first I approached this subject I divided the general structure of a treasury into *three* parts—husk, shell, and kernel; and this division, when we once have mastered the main one, will be often useful. But at first let the student keep steadily to his conception of the two constant parts, husk and seed, reserving the idea of shells and kernels for one group of plants only.

8. It will not be always without difficulty that he maintains the distinction, when the tree pretends to have changed it. Thus, in the chestnut, the inner coat of the husk becomes brown, adheres to the seed, and seems part of it; and we naturally call only the thick, green, prickly coat, the husk. But this is only one of the deceiving tricks of Nature, to compel our attention more closely. The real place of separation, to *her* mind, is between the mahogany-coloured shell and the nut itself, and that more or less silky and flossy coating within the brown shell is the true lining of the entire 'husk.' The paler brown skin, following the rugosities of the nut, is the true sack or skin of the seed. Similarly in the walnut and almond.

9. But, in the apple, two new tricks are played us. First, in the brown skin of the ripe pip, we might imagine we saw the part correspondent to the mahogany skin of the chestnut, and therefore the inner coat of the

husk. But it is not so. The brown skin of the pips belongs to them properly, and is all their own. It is the true skin or sack of the seed. The inner coat of the husk is the smooth, white, scaly part of the core that holds them.

Then,—for trick number two. We should as naturally imagine the skin of the apple, which we peel off, to be correspondent to the skin of the peach ; and therefore, to be the outer part of the husk. But not at all. The outer part of the husk in the apple is melted away into the fruity mass of it, and the red skin outside is the skin of its *stalk*, not of its seed-vessel at all !

10. I say ‘ of its stalk,’—that is to say, of the part of the stalk immediately sustaining the seed, commonly called the torus, and expanding into the calyx. In the apple, this torus incorporates itself with the husk completely ; then refines its own external skin, and colours *that* variously and beautifully, like the true skin of the husk in the peach, while the withered leaves of the calyx remain in the ‘ eye ’ of the apple.

But in the ‘ hip ’ of the rose, the incorporation with the husk of the seed does not take place. The torus, or,—as in this flower from its peculiar form it is called,—the tube of the calyx, alone forms the frutescent part of the hip ; and the complete seeds, husk and all, (the firm triangular husk enclosing an almond-shaped kernel,) are grouped closely in its interior cavity, while the calyx remains on the top in a large and scarcely withering star.

In the nut, the calyx remains green and beautiful, forming what we call the husk of a filbert ; and again we find Nature amusing herself by trying to make us think that this strict envelope, almost closing over the single seed, is the same thing to the nut that its green shell is to a walnut !

11. With still more capricious masquing, she varies and hides the structure of her ‘berries.’

The strawberry is a hip turned inside-out, the frutescent receptacle changed into a scarlet ball, or cone, of crystalline and delicious coral, in the outside of which the separate seeds, husk and all, are imbedded. In the raspberry and blackberry, the interior mound remains sapless ; and the rubied translucency of dulcet substance is formed round each separate seed, *upon* its husk ; not a part of the husk, but now an entirely independent and added portion of the plant’s bodily form.

12. What is thus done for each seed, on the *outside* of the receptacle, in the raspberry, is done for each seed, *inside* the calyx, in a pomegranate ; which is a hip in which the seeds have become surrounded with a radiant juice, richer than claret wine ; while the seed itself, within the generous jewel, is succulent also, and spoken of by Tournefort as a “baie succulente.” The tube of the calyx, brown-russet like a large hip, externally, is yet otherwise divided, and separated wholly from the cinque-foiled, and cinque-celled rose, both in number of petal and division of treasures ; the calyx has eight points, and nine cells.

13. Lastly, in the orange, the fount of fragrant juice is interposed between the seed and the husk. It is wholly independent of both ; the Aurantine rind, with its white lining and divided compartments, is the true husk ; the orange pips are the true seeds ; and the eatable part of the fruit is formed between them, in clusters of delicate little flasks, as if a fairy's store of scented wine had been laid up by her in the hollow of a chestnut shell, between the nut and rind ; and then the green changed to gold.

14. I have said '*lastly*'—of the orange, for fear of the reader's weariness only ; not as having yet represented, far less exhausted, the variety of frutescent form. But these are the most important types of it ; and before I can explain the relation between these, and another, too often confounded with them—the *granular* form of the seed of grasses,—I must give some account of what, to man, is far more important than the form—the gift to him in fruit-food ; and trial, in fruit-temptation.

CHAPTER XIV.

THE FRUIT GIFT.

1. IN the course of the preceding chapter, I hope that the reader has obtained, or may by a little patience both obtain and secure, the idea of a great natural Ordinance, which, in the protection given to the part of plants necessary to prolong their race, provides, for happier living creatures, food delightful to their taste, and forms either amusing or beautiful to their eyes. Whether in receptacle, calyx, or true husk,—in the cup of the acorn, the fringe of the filbert, the down of the apricot, or bloom of the plum, the powers of Nature consult quite other ends than the mere continuance of oaks and plum trees on the earth ; and must be regarded always with gratitude more deep than wonder, when they are indeed seen with human eyes and human intellect.

2. But in one family of plants, the *contents* also of the seed, not the envelope of it merely, are prepared for the support of the higher animal life ; and their grain, filled with the substance which, for universally understood name, may best keep the Latin one of *Farina*,—becoming in French, ‘ *Farine*,’ and in English, ‘ *Flour*,’—both in the perfectly nourishing elements of it, and its

easy and abundant multiplicability, becomes the primal treasure of human economy.

3. It has been the practice of botanists of all nations to consider the seeds of the grasses together with those of roses and pease, as if all could be described on the same principles, and with the same nomenclature of parts. But the grain of corn is a quite distinct thing from the seed of pease. In *it*, the husk and the seed envelope have become inextricably one. All the exocarps, endocarps, epicarps, mesocarps, shells, husks, sacks, and skins, are woven at once together into the brown bran ; and inside of that, a new substance is collected for us, which is not what we boil in pease, or poach in eggs, or munch in nuts, or grind in coffee ;—but a thing which, mixed with water and then baked, has given to all the nations of the world their prime word for food, in thought and prayer,—Bread ; their prime conception of the man's and woman's labor in preparing it—(“ whoso putteth hand to the *plough* ”—two women shall be grinding at the *mill*)—their prime notion of the means of cooking by fire—(“ which to-day is, and to-morrow is cast into the *oven*”), and their prime notion of culinary office—the “ chief *baker*,” cook, or pastry-cook,—(compare Bedreddin Hassan in the Arabian Nights) : and, finally, to modern civilization, the Saxon word ‘ lady,’ with whatever it imports.

4. It has also been the practice of botanists to confuse all the ripened products of plants under the general term

‘fruit.’ But the essential and separate fruit-gift is of two substances, quite distinct from flour, namely, oil and wine, under the last term including for the moment all kinds of juice which will produce alcohol by fermentation. Of these, oil may be produced either in the kernels of nuts, as in almonds, or in the substance of berries, as in the olive, date, and coffee-berry. But the sweet juice which will become medicinal in wine, can only be developed in the husk, or in the receptacle.

5. The office of the Chief Butler, as opposed to that of the Chief Baker, and the office of the Good Samaritan, pouring in oil and wine, refer both to the total fruit-gift in both kinds : but in the study of plants, we must primarily separate our notion of their gifts to men into the three elements, flour, oil, and wine ; and have instantly and always intelligible names for them in Latin, French, and English.

And I think it best not to confuse our ideas of pure vegetable substance with the possible process of fermentation : — so that rather than ‘wine,’ for a constant specific term, I will take ‘Nectar,’ — this term more rightly including the juices of the peach, nectarine, and plum, as well as those of the grape, currant, and apple.

Our three separate substances will then be easily named in all three languages :

Farina.	Oleum.	Nectar.
Farine.	Huile.	Nectare.
Flour.	Oil.	Nectar.

There is this farther advantage in keeping the third common term, that it leaves us the words *Succus*, *Jus*, *Juice*, for other liquid products of plants, watery, milky, sugary, or resinous,—often indeed important to man, but often also without either agreeable flavor or nutritious power ; and it is therefore to be observed with care that we may use the word ‘juice,’ of a liquid produced by any part of a plant, but ‘nectar,’ only of the juices produced in its fruit.

6. But the good and pleasure of fruit is not in the juice only ;—in some kinds, and those not the least valuable, (as the date,) it is not in the juice at all. We still stand absolutely in want of a word to express the more or less firm *substance* of fruit, as distinguished from all other products of a plant. And with the usual ill-luck,—(I advisedly think of it as demoniacal misfortune)—of botanical science, no other name has been yet used for such substance than the entirely false and ugly one of ‘Flesh,’—Fr., ‘Chair,’ with its still more painful derivation ‘Charnu,’ and in England the monstrous scientific term, ‘Sarco-carp.’

But, under the housewifery of Proserpina, since we are to call the juice of fruit, *Nectar*, its substance will be as naturally and easily called *Ambrosia* ; and I have no doubt that this, with the other names defined in this chapter, will not only be found practically more convenient than the phrases in common use, but will more securely fix in the student’s mind a true conception of

the essential differences in substance, which, ultimately, depend wholly on their pleasantness to human perception, and offices for human good ; and not at all on any otherwise explicable structure or faculty. It is of no use to determine, by microscope or retort, that cinnamon is made of cells with so many walls, or grape-juice of molecules with so many sides ;—we are just as far as ever from understanding why these particular interstices should be aromatic, and these special parallelopipeds exhilarating, as we were in the savagely unscientific days when we could only see with our eyes, and smell with our noses. But to call each of these separate substances by a name rightly belonging to it through all the past variations of the language of educated man, will probably enable us often to discern powers in the thing itself, of affecting the human body and mind, which are indeed qualities infinitely more its *own*, than any which can possibly be extracted by the point of a knife, or brayed out with a mortar and pestle.

7. Thus, to take merely instance in the three main elements of which we have just determined the names,—flour, oil, and ambrosia ;—the differences in the kinds of pleasure which the tongue received from the powderiness of oat-cake, or a well-boiled potato—(in the days when oat-cake and potatoes were !)—from the glossily-softened crispness of a well-made salad, and from the cool and fragrant amber of an apricot, are indeed distinctions between the essential virtues of things which

were made to be *tasted*, much more than to be eaten ; and in their various methods of ministry to, and temptation of, human appetites, have their part in the history, not of elements merely, but of souls ; and of the soul-virtues, which from the beginning of the world have bade the barrel of meal not waste, nor the cruse of oil fail ; and have planted, by waters of comfort, the fruits which are for the healing of nations.

S. And, again, therefore, I must repeat, with insistence, the claim I have made for the limitation of language to the use made of it by educated men. The word ‘carp’ could never have multiplied itself into the absurdities of endo-carps and epi-carps, but in the mouths of men who scarcely ever read it in its original letters, and therefore never recognized it as meaning precisely the same thing as ‘fructus,’ which word, being a little more familiar with, they would have scarcely abused to the same extent ; they would not have called a walnut shell an intra-fruct—or a grape skin an extra-fruct ; but again, because, though they are accustomed to the English ‘fructify,’ ‘frugivorous’—and ‘usu-fruct,’ they are unaccustomed to the Latin ‘fruor,’ and unconscious therefore that the derivative ‘fructus’ must always, in right use, mean an *enjoyed* thing, they generalize every mature vegetable product under the term ; and we find Dr. Gray coolly telling us that there is no fruit so “likely to be mistaken for a seed,” as a grain of corn ! a grain, whether of corn, or any other

grass, being precisely the vegetable structure to which frutescent change is forever forbidden ! and to which the word *seed* is primarily and perfectly applicable !—the thing to be *sown*, not grafted.

9. But to mark this total incapability of frutescent change, and connect the form of the seed more definitely with its dusty treasure, it is better to reserve, when we are speaking with precision, the term ‘grain’ for the seeds of the grasses : the difficulty is greater in French than in English : because they have no monosyllabic word for the constantly granular ‘seed’ ; but for us the terms are all simple, and already in right use, only not quite clearly enough understood ; and there remains only one real difficulty now in our system of nomenclature, that having taken the word ‘husk’ for the seed-vessel, we are left without a general word for the true fringe of a filbert, or the chaff of a grass. I don’t know whether the French ‘frange’ could be used by them in this sense, if we took it in English botany. But for the present, we can manage well enough without it, one general term, ‘chaff,’ serving for all the grasses, ‘cup’ for acorns, and ‘fringe’ for nuts.

10. But I call this a *real* difficulty, because I suppose, among the myriads of plants of which I know nothing, there may be forms of the envelope of fruits or seeds which may, for comfort of speech, require some common generic name. One *unreal* difficulty, or shadow of difficulty, remains in our having no entirely comprehensive

name for seed and seed-vessel together than that the botanists now use, 'fruit.' But practically, even now, people feel that they can't gather figs of thistles, and never speak of the fructification of a thistle, or of the fruit of a dandelion. And, re-assembling now, in one view, the words we have determined on, they will be found enough for all practical service, and in such service always accurate, and, usually, suggestive. I repeat them in brief order, with such farther explanation as they need.

11. All ripe products of the life of flowers consist essentially of the Seed and Husk,—these being, in certain cases, sustained, surrounded, or provided with means of motion, by other parts of the plant ; or by developments of their own form which require in each case distinct names. Thus the white cushion of the dandelion to which its brown seeds are attached, and the personal parachutes which belong to each, must be separately described for that species of plants ; it is the little brown thing they sustain and carry away on the wind, which must be examined as the essential product of the floret ; —the ' seed and husk.'

12. Every seed has a husk, holding either that seed alone, or other seeds with it.

Every perfect seed consists of an embryo, and the substance which first nourishes that embryo ; the whole enclosed in a sack or other sufficient envelope. Three essential parts altogether.

Every perfect husk, vulgarly pericarp, or 'round-fruit,'—(as periwig, 'round-wig,')—consists of a shell, (vulgarly endocarp,) rind, (vulgarly mesocarp,) and skin, (vulgarly epicarp) ; three essential parts altogether. But one or more of these parts may be effaced, or confused with another ; and in the seeds of grasses they all concentrate themselves into bran.

13. When a husk consists of two or more parts, each of which has a separate shaft and volute, uniting in the pillar and volute of the flower, each separate piece of the husk is called a 'carpel.' The name was first given by De Candolle, and must be retained. But it continually happens that a simple husk divides into two parts corresponding to the two leaves of the embryo, as in the peach, or symmetrically holding alternate seeds, as in the pea. The beautiful drawing of the pea-shell with its seeds, in Rousseau's botany, is the only one I have seen which rightly shows and expresses this arrangement.

14. A Fruit is either the husk, receptacle, petal, or other part of a flower *external to the seed*, in which chemical changes have taken place, fitting it for the most part to become pleasant and healthful food for man, or other living animals ; but in some cases making it bitter or poisonous to them, and the enjoyment of it depraved or deadly. But, as far as we know, it is without any definite office to the seed it contains ; and the change takes

place entirely to fit the plant to the service of animals.*

In its perfection, the Fruit Gift is limited to a temperate zone, of which the polar limit is marked by the strawberry, and the equatorial by the orange. The more arctic regions produce even the smallest kinds of fruit with difficulty; and the more equatorial, in coarse, oleaginous, or over-luscious masses.

15. All the most perfect fruits are developed *from exquisite forms either of foliage or flower*. The vine leaf, in its generally decorative power, is the most important, both in life and in art, of all that shade the habitations of men. The olive leaf is, without any rival, the most beautiful of the leaves of timber trees; and its blossom, though minute, of extreme beauty. The apple is essentially the fruit of the rose, and the peach of her only rival in her own colour. The cherry and orange blossom are the two types of floral snow.

16. And, lastly, let my readers be assured, the economy of blossom and fruit, with the distribution of water,

* A most singular sign of this function is given to the chemistry of the changes, according to a French botanist, to whose carefully and richly illustrated volume I shall in future often refer my readers, "Vers l'époque de la maturité, les fruits *exhalent de l'acide carbonique*. Ils ne présentent plus dès lors aucun dégagement d'oxygène pendant le jour, et *respirent, pour ainsi dire, à la façon des animaux*."—(Figuier, 'Histoire des Plantes,' p. 182. 8vo. Paris. Hachette. 1874.)

will be found hereafter the most accurate test of wise national government.

For example of the action of a national government, rightly so called, in these matters, I refer the student to the *Mariegolas of Venice*, translated in *Fors Clavigera* ; and I close this chapter, and this first volume of *ProsERPINA*, not without pride, in the words I wrote on this same matter eighteen years ago. “So far as the labourer’s immediate profit is concerned, it matters not an iron filing whether I employ him in growing a peach, or in forging a bombshell. But the difference to him is final, whether, when his child is ill, I walk into his cottage, and give it the peach,—or drop the shell down his chimney, and blow his roof off.

INDEX I.

DESCRIPTIVE NOMENCLATURE.

PLANTS in perfect form are said, at page 29, to consist of four principal parts : root, stem, leaf, and flower. (Compare Chapter V., § 2.) The reader may have been surprised at the omission of the fruit from this list. But a plant which has borne fruit is no longer of ' perfect ' form. Its flower is dead. And, observe, it is further said, at page 73, (and compare Chapter III., § 2,) that the use of the fruit is to produce the flower : not of the flower to produce the fruit. Therefore, the plant in perfect blossom, is itself perfect. Nevertheless, the formation of the fruit, practically, is included in the flower, and so spoken of in the fifteenth line of the same page.

Each of these four main parts of a plant consist normally of a certain series of minor parts, to which it is well to attach easily remembered names. In this section of my index I will not admit the confusion of idea involved by alphabetical arrangement of these names, but will sacrifice facility of reference to clearness of explanation, and taking the four great parts of the plant in

succession, I will give the list of the minor and constituent parts, with their names as determined in Proserpina, and reference to the pages where the reasons for such determination are given, endeavouring to supply, at the same time, any deficiencies which I find in the body of the text.

I. THE ROOT.

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Origin of the word Root.....	27
The offices of the root are threefold : namely, Tenure, Nourishment, and Animation.....	27-34
The essential parts of a Root are two : the Limbs and Fibres....	33
I. THE LIMB is the gathered mass of fibres, or at least of fibrous substance, which extends itself in search of nourishment.....	32
II. THE FIBRE is the organ by which the nourish- ment is received..	32
The inessential or accidental parts of roots, which are attached to the roots of some plants, but not to those of others, (and are, indeed, for the most part absent,) are three : namely, Store- Houses, Refuges, and Ruins.....	34
III. STORE-HOUSES contain the food of the future plant	34

IV. REFUGES shelter the future plant itself for a time.	35
V. RUINS form a basis for the growth of the future plant in its proper order.	36
Root-Stocks, the accumulation of such ruins in a vital order.	37
General questions relating to the office and chemical power of roots.	38

The nomenclature of Roots will not be extended, in Proserpina, beyond the five simple terms here given : though the ordinary botanical ones—corm, bulb, tuber, etc.—will be severally explained in connection with the plants which they specially characterize.

II. THE STEM.

Derivation of word.	137
The channel of communication between leaf and root.	153

In a perfect plant it consists of three parts :

I. THE STEM (STEMMA) proper.—A growing or advancing shoot which sustains all the other organs of the plant.	136
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It may grow by adding thickness to its sides without advancing ; but its essential characteristic is the vital power of Advance. 136

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It may be round, square, or polygonal, but is always roundly minded.....	136
Its structural power is Spiral.....	137
It is essentially branched ; having subordinate leaf- stalks and flower-stalks, if not larger branches..	139
It developes the buds, leaves, and flowers of the plant.	
This power is not yet properly defined, or explained ; and referred to only incidentally throughout the eighth chapter.....	134-138
II. THE LEAF-STALK (CYMBA) sustains, and expands itself into, the Leaf.....	133, 134
It is essentially furrowed above, and convex below.	134
It is to be called in Latin, the Cymba ; in English, the Leaf-Stalk.....	135
III. THE FLOWER-STALK (PETIOLUS) :	
It is essentially round.....	130
It is usually separated distinctly at its termination from the flower.....	130, 131
It is to be called in Latin, Petiolus ; in English, Flower-stalk.....	
These three are the essential parts of a stem. But	

besides these, it has, when largely developed, a permanent form : namely,

- IV. THE TRUNK.—A non-advancing mass of collected stem, arrested at a given height from the ground..... 139

The stems of annual plants are either leafy, as of a thistle, or bare, sustaining the flower or flower-cluster at a certain height above the ground. Receiving therefore these following names :—

- V. THE VIRGA.—The leafy stem of an annual plant, not a grass, yet growing upright..... 147

- VI. THE VIRGULA.—The leafless flower-stem of an annual plant, not a grass, as of a primrose or dandelion 147

- VII. THE FILUM.—The running stem of a creeping plant

It is not specified in the text for use ; but will be necessary ; so also, perhaps, the *Stelechos*, or stalk proper (26), the branched stem of an annual plant, not a grass ; one cannot well talk of the *Virga* of hemlock. The ' *Stolon* ' is explained in its classical sense at page 158, but I believe botanists use it otherwise. I shall have occasion to refer to, and complete its explanation, in speaking of bulbous plants.

- VIII. THE CAUDEX.—The essentially ligneous and compact part of a stem..... 149

This equivocal word is not specified for use in the text,

but I mean to keep it for the accumulated stems of inlaid plants, palms, and the like ; for which otherwise we have no separate term.

IX. THE AVENA.—Not specified in the text at all ; but it will be prettier than ‘ baculus,’ which is that I had proposed, for the ‘ staff ’ of grasses. See page 179.

These ten names are all that the student need remember ; but he will find some interesting particulars respecting the following three, noticed in the text :—

STIPS.—The origin of stipend, stupid, and stump.. ..

STIPULA.—The subtlest Latin term for straw.....

CAULIS (Kale).—The peculiar stem of branched eatable vegetables.....

CANNA.—Not noticed in the text ; but likely to be sometimes useful for the stronger stems of grasses.

III. THE LEAF.

Derivation of word.....

The Latin form ‘ folium ’.....

The Greek form ‘ petalos ’.....

Veins and ribs of leaves, to be usually summed under the term ‘ rib ’.....

Chemistry of leaves.....

The nomenclature of the leaf consists, in botanical books, of little more than barbarous, and, for the general reader, totally useless attempts to describe their forms in Latin. But their forms are infinite and indescribable except by the pencil. I will give central types of form in the next volume of *Proserpina*; which, so that the reader sees and remembers, he may *call* anything he likes. But it is necessary that names should be assigned to certain classes of leaves which are essentially different from each other in character and tissue, not merely in form. Of these the two main divisions have been already given: but I will now add the less important ones which yet require distinct names.

I. **APOLLINE.**—Typically represented by the laurel. . 51

II. **ARETHUSAN.**—Represented by the alisma. 52

It ought to have been noticed that the character of seriation, within reserved limits, is essential to an Apolline leaf, and absolutely refused by an Arethusan one.

III. **DRYAD.**—Of the ordinary leaf tissue, neither manifestly strong, nor admirably tender, but serviceably consistent, which we find generally to be the substance of the leaves of forest trees. Typically represented by those of the oak.

IV. **ABIETINE.**—Shaft or sword-shape, as the leaves of firs and pines.

V. **CRESSIC.**—Delicate and light, with smooth tissue, as the leaves of cresses, and clover.

VI. SALVIAN. — Soft and woolly, like miniature blankets, easily folded, as the leaves of sage.

VII. CAULINE. — Softly succulent, with thick central ribs, as of the cabbage.

VIII. ALOEINE. — Inflexibly succulent, as of the aloe or houseleek.

No rigid application of these terms must ever be attempted ; but they direct the attention to important general conditions, and will often be found to save time and trouble in description.

IV. THE FLOWER.

Its general nature and function 65

Consists essentially of Corolla and Treasury 78

Has in perfect form the following parts :—

I. THE TORUS. — Not yet enough described in the text. It is the expansion of the extremity of the flower-stalk, in preparation for the support of the expanding flower 66-224

II. THE INVOLUCRUM. — Any kind of wrapping or propping condition of leafage at the base of a flower may properly come under this head ; but the manner of prop or protection differs in different kinds, and I will not at present give generic names to these peculiar forms.

III. THE CALYX (The Hiding-place).—The outer whorl of leaves, under the protection of which the real flower is brought to maturity. Its separate leaves are called SEPALS..... 80

IV. THE COROLLA (The Cup).—The inner whorl of leaves, forming the flower itself. Its separate leaves are called PETALS..... 71

V. THE TREASURY.—The part of the flower that contains its seeds.

VI. THE PILLAR.—The part of the flower above its treasury, by which the power of the pollen is carried down to the seeds..... 78

It consists usually of two parts—the SHAFT and VOLUTE..... 78

When the pillar is composed of two or more shafts, attached to separate treasury-cells, each cell with its shaft is called a CARPEL..... 235

VII. THE STAMENS.—The parts of the flower which secrete its pollen..... 78

They consist usually of two parts, the FILAMENT and ANTHER, not yet described.

VIII. THE NECTARY.—The part of the flower containing its honey, or any other special product of its inflorescence. The name has often been

given to certain forms of petals of which the use is not yet known. No notice has yet been taken of this part of the flower in *Proserpina*.

These being all the essential parts of the flower itself, other forms and substances are developed in the seed as it ripens, which, I believe, may most conveniently be arranged in a separate section, though not logically to be considered as separable from the flower, but only as mature states of certain parts of it.

V. THE SEED.

I must once more desire the reader to take notice that, under the four sections already defined, the morphology of the plant is to be considered as complete, and that we are now only to examine and name, farther, its *product*; and that not so much as the germ of its own future descendant flower, but as a separate substance which it is appointed to form, partly to its own detriment, for the sake of higher creatures. This product consists essentially of two parts: the Seed and its Husk.

I. THE SEED.—Defined..... 220

It consists, in its perfect form, of three parts..... 222

These three parts are not yet determinately named in the text: but I give now the names which will be usually attached to them.

A. *The Sacque*.—The outside skin of a seed.... 221

B. *The Nutrine*.—A word which I coin, for general applicability, whether to the farina of corn, the substance of a nut, or the parts that become the first leaves in a bean. 221

C. *The Germ*.—The origin of the root. 221

II. THE HUSK.—Defined. 222

Consists, like the seed when in perfect form, of three parts.

A. *The Skin*.—The outer envelope of all the seed structures. 222

B. *The Rind*.—The central body of the Husk. 222–235

C. *The Shell*.—Not always shelly, yet best described by this general term ; and becoming a shell, so called, in nuts, peaches, dates, and other such kernel-fruits. 222

The products of the Seed and Husk of Plants, for the use of animals, are practically to be massed under the three heads of BREAD, OIL, and FRUIT. But the substance of which bread is made is more accurately described as Farina ; and the pleasantness of fruit to the taste depends on two elements in its substance : the juice, and the pulp containing it, which may properly be called Nectar and Ambrosia. We have therefore in all four essential products of the Seed and Husk—

		PAGE
A. Farina.	Flour.	227
B. Oleum.	Oil.	229
C. Nectar.	Fruit-juice	229
D. Ambrosia.	Fruit-substance	230

Besides these all-important products of the seed, others are formed in the stems and leaves of plants, of which no account hitherto has been given in *Proserpina*. I delay any extended description of these until we have examined the structure of wood itself more closely ; this intricate and difficult task having been remitted (p. 195) to the days of coming spring ; and I am well pleased that my younger readers should at first be vexed with no more names to be learned than those of the vegetable productions with which they are most pleasantly acquainted : but for older ones, I think it well, before closing the present volume, to indicate, with warning, some of the obscurities, and probable fallacies, with which this vanity of science encumbers the chemistry, no less than the morphology, of plants.

Looking back to one of the first books in which our new knowledge of organic chemistry began to be displayed, thirty years ago, I find that even at that period the organic elements which the cuisine of the laboratory had already detected in simple Indigo, were the following :—

Isatine,	Chlorindine,
Bromisatine,	Chlorindoptene,
Bidromisatine ;	Chlorindatmit ;
Chlorisatine,	Chloranile,
Bichlorisatine ;	Chloranilam, and,
Chlorisatyde,	Chloranilammon.
Bichlorisatyde ;	

And yet, with all this practical skill in decoction, and accumulative industry in observation and nomenclature, so far are our scientific men from arriving, by any decoctive process of their own knowledge, at general results useful to ordinary human creatures, that when I wish now to separate, for young scholars, in first massive arrangement of vegetable productions, the Substances of Plants from their Essences ; that is to say, the weighable and measurable body of the plant from its practically immeasurable, if not imponderable, spirit, I find in my three volumes of close-printed chemistry, no information what ever respecting the quality of volatility in matter, except this one sentence :—

“ The disposition of various substances to yield vapour is very different : and the difference depends doubtless on the relative power of cohesion with which they are endowed.” *

Even in this not extremely pregnant, though extremely

* ‘ Elements of Chemistry,’ p. 44. By Edward Turner ; edited by Justus Liebig and William Gregory. Taylor and Walton, 1840.

cautious, sentence, two conditions of matter are confused, no notice being taken of the difference in manner of dissolution between a vitally fragrant and a mortally putrid substance.

It is still more curious that when I look for more definite instruction on such points to the higher ranks of botanists, I find in the index to Dr. Lindley's 'Introduction to Botany'—seven hundred pages of close print—not one of the four words 'Volatile,' 'Essence,' 'Scent,' or 'Perfume.' I examine the index to Gray's 'Structural and Systematic Botany,' with precisely the same success. I next consult Professors Balfour and Grindon, and am met by the same dignified silence. Finally, I think over the possible chances in French, and try in Figuier's indices to the 'Histoire des Plantes' for 'Odeur'—no such word! 'Parfum'—no such word. 'Essence'—no such word. 'Eucens'—no such word. I try at last 'Pois de Senteur,' at a venture, and am referred to a page which describes their going to sleep.

Left thus to my own resources, I must be content for the present to bring the subject at least under safe laws of nomenclature. It is possible that modern chemistry may be entirely right in alleging the absolute identity of substances such as albumen, or fibrine, whether they occur in the animal or vegetable economies. But I do not choose to assume this identity in my nomenclature. It may, perhaps, be very fine and very instructive to

inform the pupils preparing for competitive examination that the main element of Milk is Milking, and of Cheese, Cheesing. But for the practical purposes of life, all that I think it necessary for the pupil to know is that in order to get either milk or cheese, he must address himself to a Cow, and not to a Pump ; and that what a chemist can produce for him out of dandelions or cocoanuts, however milky or cheesy it may look, may more safely be called by some name of its own.

This distinctness of language becomes every day more desirable, in the face of the refinements of chemical art which now enable the ingenious confectioner to meet the demands of an unscientific person for (suppose) a lemon drop, with a mixture of nitric acid, sulphur, and stewed bones. It is better, whatever the chemical identity of the products may be, that each should receive a distinctive epithet, and be asked for and supplied, in vulgar English, and vulgar probity, either as essence of lemons, or skeletons.

I intend, therefore,—and believe that the practice will be found both wise and convenient,—to separate in all my works on natural history the terms used for vegetable products from those used for animal or mineral ones, whatever may be their chemical identity, or resemblance in aspect. I do not mean to talk of fat in seeds, nor of flour in eggs, nor of milk in rocks. Pace my prelatical friends, I mean to use the word ‘ Alb ’ for vegetable albumen ; and although I cannot without pedantry avoid

using sometimes the word ' milky ' of the white juices of plants, I must beg the reader to remain unaffected in his conviction that there is a vital difference between liquids that coagulate into butter, or congeal into India-rubber. Oil, when used simply, will always mean a vegetable product : and when I have occasion to speak of petroleum, tallow, or blubber, I shall generally call these substances by their right names.

There are also a certain number of vegetable materials more or less prepared, secreted, or digested for us by animals, such as wax, honey, silk, and cochineal. The properties of these require more complex definitions, but they have all very intelligible and well-established names. ' Tea ' must be a general term for an extract of any plant in boiling water : though when standing alone the word will take its accepted Chinese meaning : and essence, the general term for the condensed dew of a vegetable vapour, which is with grace and fitness called the ' being ' of a plant, because its properties are almost always characteristic of the species ; and it is not, like leaf tissue or wood fibre, approximately the same material in different shapes ; but a separate element in each family of flowers, of a mysterious, delightful, or dangerous influence, logically inexplicable, chemically inconstructible, and wholly, in dignity of nature, above all modes and faculties of form.

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